

NOVEMBER—DECEMBER 2001

ARMY ALT



Objective Force *Our Legacy, Their Destiny*



LTG John M. Riggs
Director, Objective Force Task Force

DISTRIBUTION STATEMENT A
Approved for Public Release
Distribution Unlimited

In This Issue:

- Army Posture Statement
- TWI Workshop
- Threat Materiel Solutions

FROM THE ARMY ACQUISITION EXECUTIVE

A World Changed



On September 11, the United States entered a new era. Without warning, we became part of a world where terrorists strike and kill innocent people on American soil because they hate us and what we represent. These evildoers intended to fill us with fear, and steal our safety and security. They failed.

As we recall the madness of that day, we also remember the extraordinary courage of our firefighters, police, and emergency medical teams. We remember the generosity of Americans who lined up to donate blood, volunteer their services, and offer other types of assistance. We remember people throughout the world who shared our shock, sadness, and readily gave us their support. The evildoers intended to bring us to our knees and change our way of life. They failed.

Instead of retreating to our homes, Americans went to work. We filled our houses of worship. We showed the world how proud we are to be Americans. We brought flags out of our closets and put them on display. We sang *God Bless America*, and the world joined us in a huge chorus. The evildoers intended to isolate us and keep us from going about our normal business. They failed.

They united Americans with all others in the civilized world and sparked a war of good against evil. It is a difficult war to fight. Evil has no army, no navy, no air force. It hides in the bustle of big cities and the shadows of rock formations and caves. Its only face belongs to its elusive leader. It has no borders. Its network extends to some 60 nations. Still, good will prevail.

With the longest history in special operations and the greatest number of forces, the U.S. Army has an integral role in this global campaign against evil. Our goal is the complete destruction of international terrorism—nothing less. And, we are ready. Today's Army is prepared.

Tomorrow's Army will be even more prepared. As our transformation continues, we will become even more capable of battling terrorism and other asymmetric threats. In fact, our work has taken on an even greater importance—and urgency—since September 11. On that day, we saw our future more clearly. We saw a future where cities are battlegrounds and innocent people are targets, a future where adversaries possess the capability to wage war on American soil, and a future where deterrence is no longer sufficient.

Relative to this ominous future, we know the Army's Transformation Campaign Plan is right on target. It needs little, if any, alteration. In fact, it needs to be accelerated. This edition of *Army AL&T* magazine highlights our plans for the Army's Objective Force, our long-term development effort. This future force will maximize advances in technology and organizational adaptations to revolutionize land-power capabilities. As the Army works to develop and acquire the technologies for the Objective Force, the Legacy and Interim Forces will ensure Army readiness. Ours is a comprehensive plan to become a lighter, more mobile, more sustainable, no-less-lethal force. It's tailor-made for our uncertain world.

As we go forward, we are ever-mindful of the great sacrifices of the brave men, women, and children who died so needlessly on September 11. We continue to keep them and their loved ones in our thoughts and prayers. We hope that the complete destruction of international terrorism will somehow help to ease their pain.

Dr. Kenneth J. Oscar
Acting Army Acquisition Executive

DR. KENNETH J. OSCAR

Acting Assistant Secretary of the Army
for Acquisition, Logistics and Technology

EDITORIAL ADVISORY

BOARD MEMBERS

LTG JOHN S. CALDWELL JR.

Director, Army Acquisition Corps

LTG PETER M. CUVIELLO

Director of Information Systems for Command,
Control, Communications, and Computers

LTG ROY E. BEAUCHAMP

Deputy Commanding General

U.S. Army Materiel Command

MG GEOFFREY D. MILLER

Assistant DCSPER

MG JOHN S. PARKER

Commanding General

U.S. Army Medical Research

and Materiel Command

ERIC A. ORSINI

Deputy Assistant Secretary for Logistics

Office of the ASAALT

DR. A. MICHAEL ANDREWS II

Deputy Assistant Secretary

for Research and Technology

Office of the ASAALT

DR. LEWIS E. LINK JR.

Director of R&D

U.S. Army Corps of Engineers

DONALD DAMSTETTER

Acting Deputy Assistant Secretary

for Plans, Programs and Policy

Office of the ASAALT

HARVEY L. BLEICHER

Executive Secretary

Editorial Advisory Board

EDITORIAL STAFF

HARVEY L. BLEICHER

Editor-In-Chief

DEBBIE FISCHER-BELOUS

Executive Editor

CYNTHIA D. HERMES

Managing Editor

SANDRA R. MARKS

A. JOSEPH STRIBLING

Contract Support

To contact the Editorial Office call (703) 805-1034/35/36/38 or DSN 655-1034/35/36/38. Articles should be submitted to: DEPARTMENT OF THE ARMY, ARMY ALT, 9900 BELVOIR RD SUITE 101, FORT BELVOIR VA 22060-5567. Our fax number is (703) 805-4218. E-mail: bleicheh@aaesa.belvoir.army.mil.

Army AL&T (ISSN 0892-8657) is published bimonthly by the OASAAALT. Articles reflect views of the authors and not necessarily official opinion of the Department of the Army. The purpose is to instruct members of the Army acquisition workforce relative to AL&T processes, procedures, techniques, and management philosophy and to disseminate other information pertinent to their professional development. Private subscriptions and rates are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402 or (202) 512-1800. Periodicals official postage paid at Fort Belvoir, VA, and additional post offices. POSTMASTER: Send address changes to DEPARTMENT OF THE ARMY, ARMY ALT, 9900 BELVOIR RD SUITE 101, FORT BELVOIR, VA 22060-5567. Articles may be reprinted if credit is given to Army AL&T and the author. Unless indicated, all photos are from U.S. Army sources. Approved for public release; distribution is unlimited.

This medium is approved for official dissemination of material designed to keep individuals within the Army knowledgeable of current and emerging developments within their areas of expertise for the purpose of enhancing their professional development.

By order of the Secretary of the Army
ERIC K. SHINSEKI
General, United States Army
Chief of Staff

Official:

Joel B. Hudson
JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army
0128806

In Memory Of Those Lost On September 11, 2001

The Army AL&T editorial staff conveys its deepest sympathy to the families of LTG Timothy J. Maude, former Army Deputy Chief of Staff for Personnel; Mr. Ernie Willcher, a former Army Associate Deputy General Counsel; and the hundreds of other military and civilian personnel who lost their lives on September 11, 2001.

FEATURES

The Army's Metaphoric Stock Split

LTG John M. Riggs 2

Objective Force Systems

LTG Kevin P. Byrnes 4

Transforming Institutional Training And Leader Development

LTC Gordon K. Rogers 7

Knowledge Dominance

Keith J. Masback 9

AMC Integration For The Objective Force

Christopher S. Rinaldi, Albert S. Wedemeyer, and Michael R. Galvas 11

Warfighting Doctrine Development

LTC Barry R. Hendricks and LTC Walter H. Orthner 14

C4ISR Architectures

Steve Klynsma and MAJ Thomas Scott, UK 17

Combat Support And Combat Service Support Transformation

LTC Brian R. Layer 20

The Virtual Proving Ground

LTC Mike Landers 22

The AAC Annual Training With Industry Orientation Workshop

Sandra R. Marks 24

Threat Materiel Solutions For Army Acquisition

Jeffrey L. Langhout 26

The FY02 Army Posture Statement

..... 28

Improving Digital Terrain With Artificial Intelligence

MAJ James J. Donlon and Dr. Kenneth D. Forbus 32

Intelligent Agents: Tools For The Command Post And Commander

LTC Michael Bowman, Dr. Gheorghe Tecuci, and Mihai Boicu 34

The Developmental Firing Range At Wallops Island

COL Andrew G. Ellis and Ronald L. Frailer Jr. 36

Lessons Learned From The GMLRS IPT Process

Douglas Love 39

The Airdrop Certification Process

Sandy White and Nora Campbell 41

Assessing Effects Of Live Fire On The Enhanced M1A2 Tank

Mike Cast 43

New Medical Technology For The Injured Soldier

LTC Todd H. Furse 45

Rapid Detection Of Infectious Disease Outbreaks

MAJ Julie Pavlin 47

DEPARTMENTS

Career Development Update	50
Books	56
Acquisition Excellence	58
News Briefs	59

THE ARMY'S METAPHORIC STOCK SPLIT

LTG John M. Riggs

Our Legacy, Their Destiny—We owe the very best Army possible to the sons and daughters of America who will be wearing the uniform in the future . . . A great Army was provided to us, we should do no less for those who follow . . .

—LTG John M. Riggs
Director
Objective Force Task Force

Introduction

A stock split is defined as “an increase in a corporation’s outstanding shares without a corresponding change in the shareholders’ equity or the value of the corporation.” When a company splits its stock, the share quantity leaps ahead. Today, America is in a unique position as the shareholder of the most powerful Army in the world. And the good news is that America’s shares have just increased threefold. Our magnificent Army has announced a sort of “stock-splitting” strategy to increase its technological capabilities and global relevancy for continued near- and long-term ground warfare superiority.

Where We’re Headed

The original *share* is a full-spectrum-capable and dominant ground force currently undergoing continuous modernization efforts. The stock-splitting strategy actually began on Oct. 12, 1999, when the Secretary of the Army and the Army Chief of Staff articulated a vision entitled “The Army Transformation,” which is designed to posture the Army to better meet the demands of the 21st century. This transformation strategy capitalized into a 3-for-1 metaphorical stock split characterized by three distinctive ground force implementations: the Legacy Force (recapitalization and

selective modernization for current force improvements and enhancements), the Interim Force (the transitional force that assimilates near-term technologies), and the Objective Force (the emergence of the new and futuristic ground force combined with portions of the Legacy and Interim Forces). These three forces are being simultaneously developed and will collectively converge and transpose to a singularly superior and relevant ground force that will be strategically responsive and capable of dominating every point on the spectrum of military operations.

How We’ll Get There

The Army transformation has begun. The Legacy Force is currently being recapitalized and modernized. State-of-the-art enhancements were inspired and influenced by past war experiences, training lessons learned, and today’s global threats.

Currently, the Army is planning near-term fielding of an Interim Force that will be the transitional force leading the way in achieving the revolutionary and evolutionary future force, namely the Objective Force. The Interim Force development begins with the current implementation and fielding of two Initial Brigade-size Combat Teams at Fort Lewis, WA. These Initial Brigade-size Combat Teams will have off-the-shelf and selected specialized state-of-the-art equipment that will be fielded in accordance with an approved Modified Table of Organization and Equipment. The critical benefit gained from these initial teams will be the generation of the lessons learned and insights needed to quickly achieve the Interim Force capabilities that will enable thorough evaluation and refine-

ment of the Operational and Organizational (O&O) concept for future forces. From this, newly developed tactics, techniques, and procedures will emerge, thereby establishing the critical conditions necessary for ensuring refined development of the Interim Force. After the first Interim Armored Vehicles are fielded and an Interim Force O&O model is validated, these teams will be redesignated as Interim Brigade Combat Teams (IBCTs). Their goal is to bridge the gap between the capabilities of today’s force and the Objective Force.

IBCTs will be the vanguard of the future Objective Force. They will have limited full-spectrum capability and will be available for apportionment to the warfighting commanders-in-chief. The first of these IBCTs will be available for deployment in May 2003, with the second projected to be available in May 2004. These IBCTs will also have the capability to deploy anywhere in the world in 96 hours.

Between 2008-2010, the first units of the Objective Force will be fielded. The Army refers to this milestone as the Objective Force First Unit Equipped. Ultimately, the Objective Force will have the capability to deploy a combat-capable brigade anywhere in the world and perform a full spectrum of military operations.

A Soldier-Centric Force

The Objective Force will provide the National Command Authority (NCA) an increased range of options for regional engagement, crisis response, and sustained land-force operations. The Objective Force will be a force that embodies the decisive warfighting lethality of today’s mechanized forces with the strategic respon-

siveness of today's light forces. The Objective Force will be designed around Future Combat Systems (FCS), which will incorporate state-of-the-art technologies and capabilities, as well as integrate stovepipe functions we currently get from today's combat arms, combat support, and combat service support forces. FCS will in turn be engineered, developed, and built specifically and coherently around the soldier. The most lethal weapon on the battlefield will be the soldier. This translates into having an embedded, networked, and collective battlefield consciousness to make the soldier a diverse multimission combat warrior who dominates ground warfare across the spectrum of military operations.

America's Destiny

Throughout this metaphoric three-way stock split and subsequent capitalization regarding the Army transformation process, readiness will remain our number one priority for the Legacy Force. The Army must fulfill its non-negotiable contract with the American people—to fight and win the Nation's wars. Therefore, the Army must sustain and recapitalize its Legacy Force to guarantee critical warfighting readiness. To accomplish this, the Army will recapitalize selected legacy formations, in both Active and Reserve components, to enhance key armored and aviation systems as well as enhance light force lethality and survivability. Part of this Legacy Force requirement is to divest those systems that are no longer supportable given today's fiscal realities.

This entire process will be achieved by incorporating new and superior technologies that transcend the entire force as it moves across timelines. The culmination of this process is best understood as a journey that distinctly takes us toward a superior, dominating, and scalable future Army force—the Objective Force.

The Army's metaphoric stock split is immensely and imminently crucial to America's future. Because the Army is a premier strategic element of national policy, it must continue its 2-century-old tradition of serving our citizens well in peace and in war. To continue this vital task, the Army must change! The requirement to change and transform today's Army is based on the security challenges of a vastly dif-

ferent and dangerous 21st century and the need to respond more rapidly and decisively across the full spectrum of military operations. Thus, the Army has initiated a bold, yet necessary, set of initiatives that will transform it into an Army that will remain relevant while protecting our Nation in the future! This will be the Objective Force!

What's The Objective Force?

The Objective Force will be the force that achieves the Army's transformation objective. It will be a force that is *responsive, deployable, agile, versatile, lethal, survivable, and sustainable*. The Objective Force is based on capabilities supported by leading-edge technologies that will focus on four criteria. First, the Objective Force will be a soldier-centered force. Objective Force soldiers will be intrinsically equipped and integrated with leap-ahead technologies that provide them internetted air, ground, and space knowledge-based and lethality capabilities. Making these soldiers an integral part of this "system-of-systems" enables them to dominate across the spectrum of military operations. Second, the Objective Force will capitalize on technologies that enable it to employ precision engagement on land with significant improvements in lethality, range, and accuracy. Third, the Objective Force will acquire the speed and agility in positioning and repositioning to ensure the joint team dominates land maneuvers. Fourth, the Objective Force will serve as a strong deterrent to potential adversaries by providing the NCA greater flexibility through a broader range of strategic options.

Task Force Genesis

The culmination of the Army vision is having the Objective Force achieve dominance across the full spectrum of military operations. That means the path must be carefully mapped and managed by our best professionals. This is being realized through a programmatic and organizational approach. Secretary of the Army Thomas E. White and Army Chief of Staff GEN Eric K. Shinseki have directed the formation of a task force to execute the mission of synchronizing, integrating, and assessing activities related to building the Objective Force. This task force is known as the Objective Force Task Force (OFTF).

The OFTF is the single, overarching, integrating activity within the Department of the Army that provides the direction, means, and impetus for the Objective Force. Objective Force efforts are associated with development of each of the Army domains: Doctrine, Training, Leader Development, Organization, Materiel and Soldiers (DTLOMS-pronounced "det-lomes").

OFTF Mission

The mission of the OFTF is to ensure the realization of the Objective Force. The OFTF integrates all aspects of the Army transformation to accelerate the delivery of the Objective Force to the Army. The OFTF provides the means to enable senior Army leaders to assess progress in developing the Objective Force and synchronize all linked Objective Force programs with their integration into the Army. OFTF efforts are synchronized with the ongoing Army Transformation Campaign Plan with the focus on achieving initial Objective Force capabilities this decade. Modernization of the Legacy Force and attainment of an Interim Force support the goals and processes used in the pursuit of the Objective Force. Lessons learned will be shared by all elements of the transformation process.

Conclusion

The articles featured in this issue of *Army AL&T* provide an in-depth perspective of the transformation efforts and processes to achieve the Objective Force. This endeavor is not just about improving today's most powerful Army on the planet, it is about continuing and ensuring the "Free World's" sovereignty over emerging factions that threaten future world peace and, ultimately, freedom.

LTG JOHN M. RIGGS is the Director of the Objective Force Task Force. He most recently served as the Commanding General of the First U.S. Army, Fort Gillem, GA. He holds a B.A. in political science, an M.A. in personnel management and administration, and has completed a National Security Fellowship at Harvard University's John F. Kennedy School of Government.

OBJECTIVE FORCE SYSTEMS

LTG Kevin P. Byrnes

Fielding Capabilities For Tomorrow's Requirements

Introduction

The Army has embarked on a revolutionary path of change to ensure that the best Army in the world today remains fully prepared for the strategic challenges and operational demands of tomorrow. Transformation is the watchword for this path, and the Objective Force is the description for the Army of the future. Our enduring goal and challenge is to sustain the dominant qualitative edge of the Army over all potential adversaries.

Transformation to the Objective Force is conceptually about a revolution in the way the Army fights. It requires a science and technology (S&T) effort that focuses on yielding a knowledge-based operational capability, while increasing strategic deployability and operational and tactical mobility.

A Complex Change

Army transformation is about more than just procurement of equipment. It also integrates the advancements in Doctrine, Training, Leader Development, Organization, Materiel and Soldiers (DTLOMS);

installations; and business processes. This new way of fighting will become a reality only through fielding of equipment organized into effective systems. Ultimately, these systems must be integrated into units and manned by trained soldiers, who remain the Army's enduring and most important "system." Furthermore, for transformation to succeed, it will be absolutely essential to identify, develop, and incorporate new technologies into effective systems. When it comes to Army systems, the Office of the Deputy Chief of Staff for Programs has the programmatic lead, including future systems for the Objective Force.

Role Of Force Development

During transformation, the role of the Army staff's Force Development Directorate remains much the same as it was in past decades—converting requirements into capabilities that can be used by soldiers and units. The end result will be the development of systems that can be implemented by technologically feasible and fiscally affordable programs. To achieve the ambitious goals of fielding a more responsive

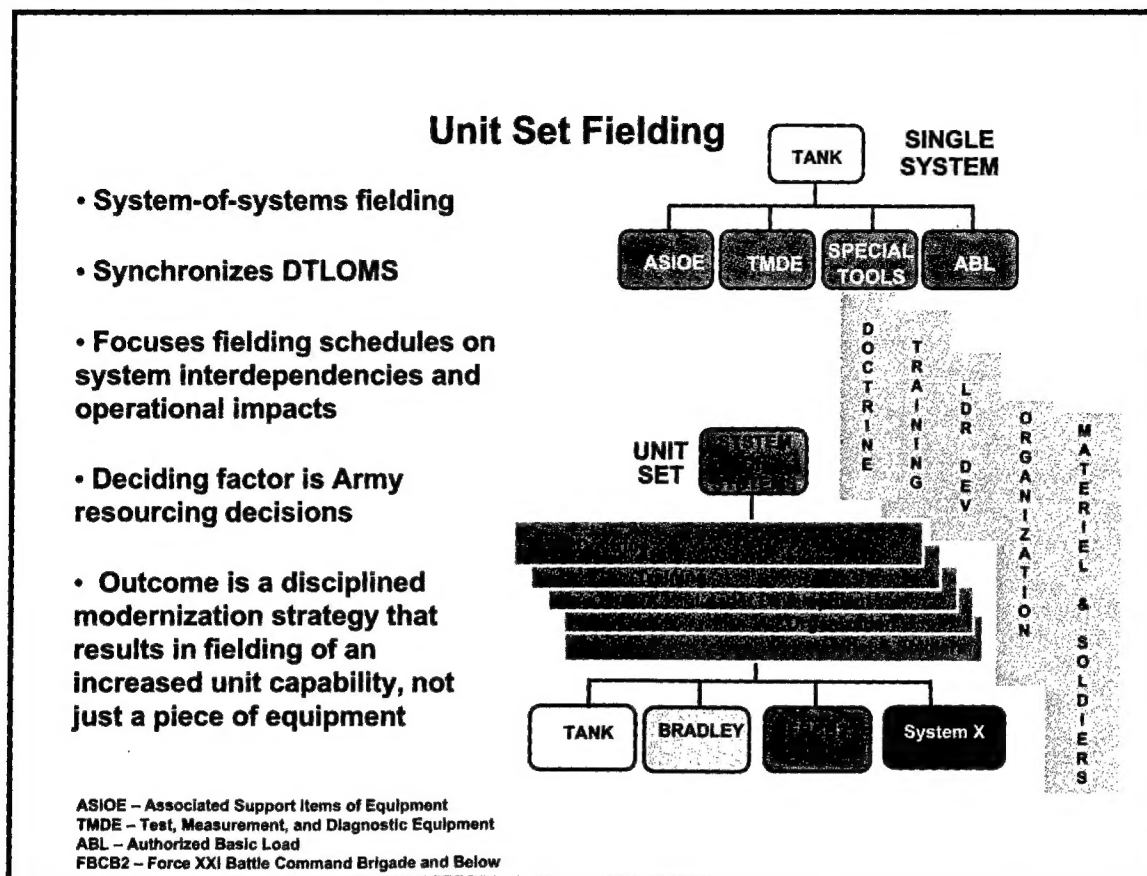
and capable force in the future—the Objective Force—the Army must find ways to harness the revolutionary breakthroughs in S&T and convert them into viable systems and, ultimately, into programs that comprise future years' Army budgets.

Transformation Timeline

Transformation is a 30-year process that depends on technological developments, funding levels, and unit availability. The desired characteristics of the Objective Force described in the Army vision are responsiveness, deployability, agility, versatility, lethality, survivability, and sustainability. The materiel means of achieving these characteristics are still being developed, and will be for years to come.

Transformation will span decades, not just years. Thus, the process of developing and fielding systems for the Objective Force will be ongoing and will include current systems, projected systems, and ones that are now only in the conceptual phase. Some systems that exist in the Army today, the Javelin anti-armor weapon system for example, are relatively modern in their capability and technological advancement. As such, these systems will be part of the Army inventory for many years—certainly into the period when Objective Force units are coming into existence—2010 and beyond. Other systems, such as the Comanche helicopter and Crusader advanced field artillery system, are entering the force within the next 5 years or so, and will likewise be integral components of the future force for decades to come. Finally, other systems such as the Future Combat Systems (FCS)—the "system-of-systems" that comprise the foundation of the Objective Force—are in the early stages of S&T exploration and may not actually be converted into deployable systems until the end of this decade or beyond. Managing

Implementing Transformation



and balancing all of these systems—present, next-generation, and future—represents a major challenge to successful transformation of the Army and a particular responsibility of the Army's force development process.

Material Solutions

As mentioned earlier, the Army is not simply about individual platforms or pieces of equipment, but rather about systems that comprise all elements—DTLOMS—harmonized together in functional organizations or units. Materiel solutions, however, in the form of well-conceived, professionally developed, acquired, and tested hardware systems, remain a decisive element of the Army's future effectiveness.

The harnessing of new technologies within these materiel systems is what gives such exciting promise to the Army's ongoing transformation efforts. In fact, it is the key to our future! As such, it is also the integral part of the Army's research, development, and acquisition budget, which amounts to \$19.1 billion for FY02. Of that amount, more than 60 percent will be devoted to investing in Objective Force systems, including those systems that are available now and will be retained for continued use or systems that will be fielded in the future.

The seedbed for innovative technological advances in these systems, especially the ones yet to be developed, can be found in S&T efforts that are exploring revolutionary tech-

nologies. Of these investments (\$8 billion between now and FY07), 96 percent are being devoted to developing technologies for Objective Force systems.

Objective Force Systems

Among the Army's Objective Force systems, the development of FCS is the central materiel focus, with 37 percent of S&T funding being used to find and develop the new technologies needed for this system-of-systems. The Army is also seeking to simultaneously mature and develop technologies for other systems that will be essential to achieve full-spectrum dominance, which is the intended hallmark of the Army of the future.

One of the more prominent efforts is in the area of command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR), which has the overarching goal of improving comprehensive situational awareness for the future Army. Advanced sensors, intelligence and electronic warfare systems and techniques, and specialized electronics and computer systems are a few of the areas offering great promise. Examples of other promising areas include rotorcraft technology, technologies to enhance the future infantry soldier, technologies to improve deployability and reduce logistics demand, advanced training tools and methods, simulation tools, and technologies to improve survivability and lethality.

Achieving a decisive edge in the all-encompassing area of information technology is a broad theme of the Army's technological pursuits, but by no means is it the only one. Another goal is the imperative to significantly improve strategic responsiveness. This will require revolutionary advances in numerous technology areas to produce not only lighter and more easily sustainable forces, but also forces that simultaneously possess even greater lethality and survivability than those of today's Army. These challenges are formidable, but are also well within the realm of technological potential.

A specific example of technological potential is the Common Missile, currently under development for use as a future Objective Force munition. This particular acquisition initiative aims to develop and field a common missile for use in multiple ground and air platforms, from current to future systems, including both the Comanche and possibly the FCS. The goal of this program is to tap into new technologies that can yield increased capability and greater operational flexibility while simultaneously reducing the logistics burden

and ownership costs to the entire force. This type of innovative approach is what the Army needs to enable successful transformation through technological advances and concurrently keep costs and complexity within appropriate bounds.

Combat-Capable Units

The Army plans to use the Unit Set Fielding (USF) concept to implement the Army vision of becoming strategically responsive and dominant across the full spectrum of operations. USF describes both a strategy and process involving the assembly and issuance of a set of several individual, interactive systems to a particular unit. Related to this process is the concurrent fielding of all required support, such as ranges, training aids, ammunition, spare parts, and personnel.

Collectively, these processes focus on providing the greatest capability, not necessarily the largest number of individual systems, by synchronizing fielding plans and deconflicting demands on soldiers. Overall, this "balanced" approach of fielding systems-of-systems rather than simply individual pieces of equipment means that the Army will get far greater value for its invest-

ment throughout the transformation process.

Challenges

The Army's goal of developing and fielding an Objective Force to realize the full potential of revolutionary new technologies is well underway. Many systems that will be part of this force are being introduced into the Army in synchronized sets of equipment. Others, such as the FCS, will be introduced by the end of this decade. Transformation is indeed a process or path, not simply a destination. As such, it will require a sustained and focused effort to yield the dramatic improvements envisioned by tapping into S&T breakthroughs in the 21st century. Objective Force systems will cover a broad spectrum of capabilities, functions, and specialties. While the FCS is the most visible and promising example of the future Army, other systems are also being developed and will comprise a larger part of the total Army effort. Ultimately, the synergy of all Objective Force systems will yield the full potential of a transformed Army, which is another reason why the USF process is so critical to improved capabilities.

Conclusion

Sustained S&T efforts coupled with efficient processes to field systems once they are developed are indispensable for the promises of transformation to become future realities. The Army has already begun to transform, and continued support will be required to preserve the momentum already established.

LTG KEVIN P. BYRNES is the Army Deputy Chief of Staff for Programs. He has a B.A. degree in economics and business administration from Park College and an M.A. degree in management from Webster University.

*The Army's goal
of developing
and fielding
an Objective Force
to realize
the full potential
of revolutionary
new technologies
is well underway.*

Introduction

In October 1999, the Army Chief of Staff (CSA) initiated a comprehensive transformation of the Army to create a more responsive, deployable, agile, versatile, lethal, survivable, and sustainable force capable of missions across the full spectrum of conflict. Soon thereafter, the Commanding General (CG), U.S. Army Training and Doctrine Command (TRADOC) directed an internal study to identify potential modifications to processes, products, and organization. The purpose was to ensure that the Army's institutional foundation continues to contribute to the readiness of the operational force as well as support its transformation to the Objective Force. This continuing study focuses on the skills, abilities, and characteristics that future soldiers and leaders must possess; changing the training and leader development education systems; and creating an organizational structure that will most effectively and efficiently support requirements of the full-spectrum operational environment. Each of these factors is critical in ensuring that TRADOC produces well-trained soldiers and competent, confident leaders for today's Army as we transition to the Objective Force.

On June 1, 2000, the CSA directed the CG, TRADOC to convene an Army Training and Leader Development Panel (ATLDP) to review, assess, and provide recommendations for the development and training of our 21st century leaders. A summary of the results of the panel's work including specific findings and recommendations is available at <http://www.army.mil/features/ATLD/ATLD.htm>. A second panel, focusing on noncommissioned officers, is in session as of this writing. This study will be followed by a warrant officer study.

Based on the internal TRADOC study and the findings and recommendations of the ATLDP officer study, TRADOC is preparing a strategic plan to redesign the Army's institutional base to optimally support both the current and future operational force. We will achieve this through robust and relevant training and leader development programs delivered by a streamlined, technology-enhanced organizational structure. We will leverage technology to create virtual links between the institutional training base and

TRANSFORMING INSTITUTIONAL TRAINING AND LEADER DEVELOPMENT

LTC Gordon K. Rogers

units to facilitate on-demand soldier access. We believe this information-age approach will minimize the work-force and equipment requirements associated with the current World War II era training model.

Training at the senior levels will continue to focus on strategic leadership. Overall, we seek to achieve a revitalized professional military education system grounded in hands-on experiential training supported by the following:

- **Common core instruction** in all courses of the three education systems (officer, warrant officer, and noncommissioned officer) will facilitate career-long, progressive, and sequential leader development. Where appropriate, common core tasks will be horizontally aligned across the three education systems to provide an opportunity for officers, warrant officers, and noncommissioned officers to train together on tasks they will perform together in the field.

- **Distance learning** technology will expand educational access and opportunities. Virtual linkage between combat training centers (CTCs) and schoolhouses worldwide will facilitate sharing of real-time operational experiences.

Warfighting Training

Soldiers and leaders must be competent in the warfighting capabilities and doctrine required to execute operations in a full-spectrum environment. They must be knowledgeable and experienced in analyzing their unit's battlefield operation and sustainment

capabilities. The warfighting module will teach leaders standard U.S. Army techniques and procedures for tactical decisionmaking and the tactical employment of brigades and battalions in full-spectrum operations. Warfighting training will be tactically focused, hands-on, and involve an execution-oriented training module. The warfighting module will culminate with a simulation exercise to test the ability of leaders to rapidly make decisions and synchronize all of the battlefield functional area systems within the framework of full-spectrum operations. The intent of the warfighting curriculum is to produce officers, warrant officers, and senior noncommissioned officers who are proficient in maneuvering, supporting, and sustaining brigade, battalion, and company units.

Branch/Tactical Training

The foundation of Objective Force unit competency is world-class branch technical and tactical training. The role of the branch school is paramount during the initial stages of a leader's career, the time when an individual receives grounding in branch-specific systems and equipment. Branch schools will continue to provide functional training in the new education system, but much of this training will increasingly be delivered through distance learning and training support to soldiers and units in the field. Branch schools will continue to fill the role of a subject matter expert and provide a reachback capability for soldiers outside of school. Branches will continue to sustain the arms profession.

Resident Curricula

To provide the skills, knowledge, and attributes required in the Objective Force, resident school curricula will increasingly focus on teaching the nature of war as opposed to merely the scientific conduct of war. The Objective Force operational environment demands leaders who can reason and make decisions in new and unexpected situations. The Objective Force leader must visualize, describe, and direct operations in the field in both linear and nonlinear conditions in a full-spectrum environment.

Resident curricula will be designed to instill an appreciation for end states and conditions, centers of gravity, decisive points, culminating points, and lines of operation. Objective Force leaders must understand operational reach, approach, and pause and tempo of battle. They must be able to plan and execute simultaneous and sequential operations. They must also be able to articulate their vision and intent to their subordinates for planning and execution. The new curricula will teach leaders to be mission-focused, performance-oriented, and instill a train-as-you-fight philosophy in their units. Objective Force leaders will be the doctrinally sound, primary trainers, who know themselves and can build a team fostered by life-long learning and mentorship.

Emerging Initiatives

The ATLDP concluded that two periods occur in an officer's career when institutional experience plays a critical role: initial entry when the institution prepares an officer to lead small units, and promotion to major when the institution prepares an officer for field-grade responsibilities in a wider variety of staff, command, and leadership positions at the tactical and operational levels. Based on panel recommendations and emerging conclusions of the TRADOC study, a comprehensive review and revision of officer, warrant officer, and noncommissioned officer professional military education is underway. Several emerging educational initiatives that will affect the officer education system are included in a comprehensive institutional leader development campaign plan. Some of these initiatives are discussed below.

Basic Course

The Basic Officer Leaders' Course focuses on initial leader development for all second lieutenants. Phase I, conducted prior to branch technical/tactical training, is designed to meet newly commissioned lieutenants' expectations and develop small-unit leaders with a common warfighting focus and warrior ethos. This phase embeds a common Army standard for small-unit fighting and leadership and provides hands-on, tactical leadership training. A combined arms cadre provides students with continuous feedback on leadership performance. Phase II provides training on platoon-level, branch-specific, tactical and technical skills. The purpose is to develop tactically and technically competent and confident small-unit leaders who have established a bond with their combined arms peers and are ready to assume leadership positions. The Infantry School will run Phase I pilots in FYs 01 and 02.

Intermediate Level Education (ILE)

Under Officer Personnel Management System XXI, ILE will be implemented no later than the fourth quarter of FY03. ILE prepares individuals for success as field-grade officers regardless of their career field, branch, or functional area (FA), giving them both a common core of Army operational instruction, and career field, branch, or FA education. The Command and General Staff College will develop and pilot the ILE common core curriculum in FY02. It will also develop and pilot the Advanced Operations and Warfighting Course to be taught to operations career field officers at Fort Leavenworth, KS, in FY03.

Tactical Commanders Program

The Citizens Advisory Commission (CAC) will redesign the Tactical Commanders Development Program (TCDP) to better prepare battalion and brigade commanders for full-spectrum operations, provide more experience-based commander training, expand Reserve component participation, and embed a virtual CTC experience. Revisions to the TCDP will be developed in FY02 and piloted and implemented beginning in FY03.

CAC Efforts

The CAC will create a program of instruction that provides expanded knowledge of Army Service Component Command (ASCC) and Army force (ARFOR) structures as well as missions for officers. The ASCC plans the re-deployment of ARFOR in a joint force environment, including reconstitution. The ASCC is also responsible for satisfying training, administrative, and logistics requirements for ARFOR. Required distributed courseware will be available at the time officers are assigned to an ASCC headquarters. Development and piloting of this courseware is expected in FY03 and distribution in FY04.

Similar professional military education initiatives for warrant and non-commissioned officers will follow based on the findings and recommendations of the CSA Army panel addressing the development and training of our 21st century leaders (noncommissioned and warrant officers).

Conclusion

To successfully field and implement the Objective Force, soldiers and adaptive leaders should be developed using a focused approach. TRADOC must provide the Army with soldiers and leaders having standards-based competencies who can successfully lead and train their units while fully integrating combined-arms capabilities in a full-spectrum operational environment. This combined-arms, full-spectrum operational approach is the foundation for developing curricula that support our training and education requirements and the strategic underpinnings for the human dimension.

LTC GORDON K. ROGERS is a Senior Military Analyst in the TRADOC Transformation Directorate. He received a B.S. from Jacksonville State University and an M.A. from Webster University. He is also a graduate of the Joint Forces Staff College.

KNOWLEDGE DOMINANCE

Keith J. Masback

See First, Understand First, Act First, And Finish Decisively

Introduction

For as long as mankind has waged war, commanders have sought dominant knowledge of the battlespace to defeat their enemies while minimizing their own losses. In the absence of that knowledge, great battle captains relied on an innate ability to take fragments of information about the battlefield and sense the opportunities for their own forces and the vulnerabilities of their adversaries. Still others mastered military history in hopes of applying lessons from the past to their current and planned operations. Desert Storm provided us with a glimpse of the future and represented the first war where technology-enhanced access to information made a decided difference in the outcome of engagements, battles, and the campaign. Superior battlespace knowledge, combined with a highly trained, well-equipped force, enabled coalition commanders to direct their forces with near impunity.

As technology evolved in ways we could not imagine, and we worked to leverage those advances to provide relevant knowledge to commanders at every echelon, the operational environment changed as well. The contemporary global security environment is both complex and ambiguous. Unrest and conflict scenarios range from competition among states to failed states unable to withstand the strains of resource scarcity, population growth, and ethnic and religious militarism.

Our current and potential foes have proven to be knowledgeable and adaptive, and they constantly seek ways to counter, often in an asymmetric fashion, our significant advantages in people, training, and technology. In recognition of this shifting and ambiguous threat, the Army is changing to meet the challenge. The uncertain nature of potential future adver-

saries mandates that the Army have a rapid, decisive capability to respond across the full spectrum of operations, while operating within joint and coalition constructs. The Army will remain the premier land force, optimized for the challenges of the 21st century as it moves toward its future state, the Objective Force.

Challenges

The principle operational challenge for the Objective Force is the transcendent requirement for early and continuous application of strategic power in all dimensions of the battlespace and in all operations. The Objective Force will respond with trained, disciplined, and expertly led soldiers equipped with highly lethal, leading-edge weapon systems. The force will be enabled by precise knowledge at the point of decision obtained by leveraging expert personnel and advanced information technologies. The Objective Force accepts a reduced level of armor-based protection to gain strategic responsiveness. This risk is mitigated by increased tactical and operational speed, versatility, agility, sustainability, and lethality.

Perhaps the single greatest enabler for the bold vision of the Objective Force is dominant battlespace knowledge. This knowledge will allow the future force to develop the situation without using "movement-to-contact" techniques by engaging opposing forces with beyond-line-of-sight and non-line-of-sight capabilities. In turn, the capabilities will also allow the force to precisely dictate the time and circumstances under which it will conduct close engagement. Recognizing this as both an awesome challenge and a remarkable opportunity, Army intelligence and the entire intelligence, surveillance, and reconnaissance (ISR)

battlefield functional area (BFA) are transforming to meet the challenge and seize the opportunity.

Army intelligence leaders envision an integrated "mud-to-space" Army intelligence team projecting knowledge at the point of decision and empowering the Objective Force to see first, understand first, act first, and finish decisively. Although this vision addresses the full scope of Army transformation (Legacy, Interim, and Objective Forces), this article focuses only on preparations to meet the needs of the Objective Force.

The Army intelligence community is challenging the status quo; seeking better ways of doing business; and looking for advancements across Doctrine, Training, Leader Development, Organization, Materiel and Soldiers-Policy (DTLOMS-P). The bedrock of this transformation is a world-class intelligence team made up of soldiers, Department of the Army civilians, and contractors focused on the needs of commanders at every echelon.

To be mission-capable, the Objective Force must possess integrated knowledge of the battlespace in all dimensions, and the Army intelligence community must contribute significantly to creating unprecedented situational awareness in space and time by reducing the uncertainty and "fog of war." The demands of Objective Force operational concepts create a *de facto* contract with Army intelligence to "get it right" so that no future commander is surprised.

Another vision for Army intelligence transformation is the creation of the "tactical infosphere" for Objective Force commanders, analogous in some respects to a Navy carrier battle group today. As this Navy entity sails the seas, it creates a sphere (subsurface, surface, and aerospace) in which it enjoys an

informational overmatch, precluding surprise and preserving freedom of action. Army intelligence, operating within and integrating the broader construct of the ISR BFA, will be integral to operations as commanders seek to visualize, describe, and direct.

Army intelligence efforts will be directed at translating, orchestrating, and synchronizing the commander's knowledge requirements with operations. This will be accomplished with an adaptively packaged forward intelligence force, including area experts and tailored systems. This force will be capable of reaching from mud to space and to national, joint, and coalition entities (from joint platforms to national-level knowledge centers) for information and knowledge. The intelligence force will also be prepared to gather information to supplement and expand on the significant capabilities of the Future Combat Systems (FCS).

The Army intelligence team will integrate information from all possible sources on the battlefield, across every BFA, including FCS, Comanche, and brilliant weapons. This will be combined with data collected from beyond the range of organic sensors. Enabled by a robust information transport layer, commanders will gain knowledge in a manner tailored to enable decisions. The goal is instantaneous, continuous, near-certain knowledge allowing the Objective Force commander to plan, rehearse, and execute at a speed and certainty that no opponent can match, regardless of the environment.

Science And Technology

Although this vision of the future relies on broad, sweeping change across DTLOMS-P, our ongoing work in the world of science and technology (S&T) and research, development, and acquisition is a particularly important area for Army intelligence transformation. Relative to S&T, Army intelligence has a unique dual mission. Not only must we seek technological advances to enable our vision, but our skilled, agile team must protect the tremendous investment that the Army is making to realize leap-ahead capabilities for the Objective Force. This demands countering foreign intelligence activities, along with identifying and correcting security vulnerabilities. A cadre of

security, foreign disclosure, and counterintelligence professionals spread throughout the Army are our warriors in this battle, helping commanders assess and mitigate risk from a complex and diverse network of threats. As our education and training programs heighten awareness and our efforts to defeat attempts to gain access to our information continue, we believe that we can preserve the promise of combat overmatch for the Objective Force.

Additionally, Army intelligence efforts must be geared to seeking out those key investment areas that hold the best promise for assuring our ability to deliver the knowledge edge to the Objective Force. Effective S&T is integral to each of the Army intelligence core competencies. Clearly, S&T priorities and energy must focus precisely on modifying or developing technology that can help gather, process, organize, store, and retrieve large amounts of data, information, and knowledge.

Concurrently, we must be able to share information and collaborate with leaders and other knowledge workers. Ultimately, these efforts will support decisionmaking and enhance other actions.

S&T efforts must also focus on presenting and visualizing in ways that complement the individual thinking preferences of commanders and leaders. The dominant challenge for realizing the Army intelligence vision is that of integration, and our efforts must reflect this. It will also be necessary to leverage the S&T investments of our sister Services, the national intelligence community, other governmental agencies, and the cutting-edge S&T programs of the commercial and academic sectors.

Acquisition

Army intelligence is assuredly "ahead of the curve." By continually assessing the operational environment and conducting thorough, introspective evaluations during the last 10 years, the Army ensured that its key systems are optimized for full-spectrum operations with the Objective Force. In particular, we benefited from the great work of our acquisition community, specifically, the Program Executive Office for Intelligence, Electronic Warfare and Sensors; the Program Executive Office for Command,

Control and Communications Systems; and the Army Space Program Office. Collectively, these offices reduced the number of Army intelligence systems from 19 to 9, increased interoperability, moved to a multi-intelligence capability, used best-business practices to rapidly put advanced capabilities into the hands of soldiers, and ensured that all systems would have roll-on/roll-off capability on C-130-type aircraft. Building on these achievements, we are poised to enable Objective Force success with five key systems which, when combined in an integrated architecture, will help deliver the knowledge edge. These systems are the Aerial Common Sensor; Tactical Unmanned Aerial Vehicle; Prophet (tactical level signals intelligence system); the Distributed Common Ground Station-Army; and our piece of the Army Battle Command System, the All Source Analysis System.

Conclusion

Army intelligence and the ISR BFA are critical to Objective Force mission success. Furthermore, superior ISR and cutting-edge information operations are integral to the emerging operational tenets of the future Army. The Army intelligence leadership has a bold vision to achieve this challenge. A world-class team, working collaboratively using the most technologically advanced tools available, along with our joint and national partners, are uniting to provide the Objective Force with the knowledge edge. No surprises, no more meeting engagements, lifting the fog of war—Army intelligence is "always out front!"

KEITH J. MASBACK is a Senior Intelligence Professional serving as the Director of the Army Intelligence Master Plan in the Office of the Army Deputy Chief of Staff for Intelligence. He has a bachelor's degree in political science from Gettysburg College and has completed the Postgraduate Intelligence Program.

AMC INTEGRATION FOR THE OBJECTIVE FORCE

Christopher S. Rinaldi, Albert S. Wedemeyer, and Michael R. Galvas

Introduction

The Army vision for the Objective Force (OF) is "A force that is responsive, deployable, agile, versatile, lethal, survivable and sustainable" at any point along the spectrum of operations, anywhere in the world. Achieving this vision will require a multitude of innovative and integrated technologies. The Army Materiel Command (AMC) and its subordinate research, development and engineering centers (RDECs) and Army Research Laboratory (ARL) provide a synergistic team to integrate technology for the Objective Force.

To focus on the Objective Force, the AMC Commanding General has established a Technology Integration Board (TIB) and an AMC OF Integrated Product Team (IPT). The TIB is composed of the Technical Directors from the AMC RDECs, the ARL Director, the AMC Deputy Chief of Staff for Research, Development and Acquisition (DCSRDA), and the Assistant DCSRDA/Science and Technology (S&T) Advisor. The TIB provides broad guidance to the AMC OF IPT.

The AMC OF IPT, which consists of senior acquisition personnel representing each of the RDECs and ARL, meets at AMC Headquarters. Figure 1 shows the AMC organizations represented on the IPT and most of the key stakeholders in the Objective Force community. The mission of the AMC OF IPT is to provide integrated materiel developer and acquisition management expertise to the Objective Force community.

Materiel Development

Future Combat Systems (FCS) are essential to the Objective Force, and the AMC OF IPT is engaged in advancing three efforts to facilitate technology transfer between the AMC RDECs and FCS industry teams. These are a technical library, an overarching Cooperative Research and Development Agreement (CRADA), and a risk-management program. The following paragraphs describe each of these.

The technical library is a Web-based information system that provides FCS industry teams access to a comprehensive database of AMC S&T programs. The database is organized by science and technology objectives and includes relevant information regarding the purpose, performance metrics, technology readiness level, and description and point-of-contact information for each program. It is updated periodically according to the Department of the Army (DA) review process known as the Army Science and Technology Working Group (ASTWG). The technical library ensures that all of the

FCS industry teams have equal access to the AMC S&T programs.

The second effort is the overarching CRADA (Figure 2). The purpose is to standardize and streamline the business arrangements between the AMC RDECs and the FCS industry teams. The overarching CRADA will include corporate business arrangements common to all RDECs, yet will still provide flexibility to accommodate individual industry teams. Potential common business arrangements include exchange of data, trademarks, patents, inventions, joint inventions, and proprietary and protected information. Under the umbrella of the overarching CRADA, cooperative projects will be negotiated between the RDECs and FCS industry teams in coordination with AMC Headquarters. The cooperative projects will include business arrangements specific to the RDECs. Potential specific business arrangements include scope of work, personnel resources, transfer of funds, testing, and test facilities. The overarching CRADA will encourage government

*In addition to providing technology
as a materiel developer, AMC also provides
acquisition management expertise
to the Objective Force community.*

*AMC personnel have acquisition management
expertise in all stages of the acquisition life cycle,
and they provide it to the Objective Force community
in various forums.*

and industry teaming and will ensure equitable treatment for all participants.

The third effort initiated by the AMC OF IPT is a risk-management program. Risk management is a method for tracking program execution used by program managers (PMs) for development and production programs. For S&T programs, each AMC RDEC currently employs its own methods for monitoring cost, schedule, and performance. A pilot program was initiated to develop a standardized reporting process for risk management of S&T programs associated with the Objective Force. This pilot program includes periodic red, yellow, or green evaluations of risk that display the likelihood of occurrence and significance of impact on achieving the stated objectives of the program. The two S&T programs selected for the pilot program are the Multi-Role Armament and Ammunition System and the Compact

Kinetic Energy Missile. Depending on the results of the pilot program, this effort may be expanded to include all Objective Force S&T programs performed by the RDECs.

Acquisition Management

In addition to providing technology as a materiel developer, AMC also provides acquisition management expertise to the Objective Force community. AMC personnel have acquisition management expertise in all stages of the acquisition life cycle, and they provide it to the Objective Force community in various forums.

First, AMC participates in the Objective Force Task Force (OFTF) Council of Colonels and two-star level IPT meetings, Training and Doctrine Command (TRADOC) Objective Force wargaming exercises, the DA ASTWG process, and the FCS industry team quarterly process reviews. By partici-

pating in these forums, AMC can provide integrated support to the Objective Force.

Second, the PM, FCS uses various IPTs to supplement his staff and manage the program. Examples include analysis, operational, system, technical, and cost IPTs that provide independent objective evaluations of industry team progress. The members of these teams are predominantly technical acquisition experts from the AMC RDECs, ARL, and the Army Materiel Systems Analysis Activity.

Third, AMC is contributing to the development of the draft FCS Acquisition Strategy via coordination and review by the appropriate subject matter experts. AMC professionals have a proven track record of moving products through the acquisition life cycle to the field. Further, a new solicitation is currently being prepared for the next phases of the FCS Program. To prepare

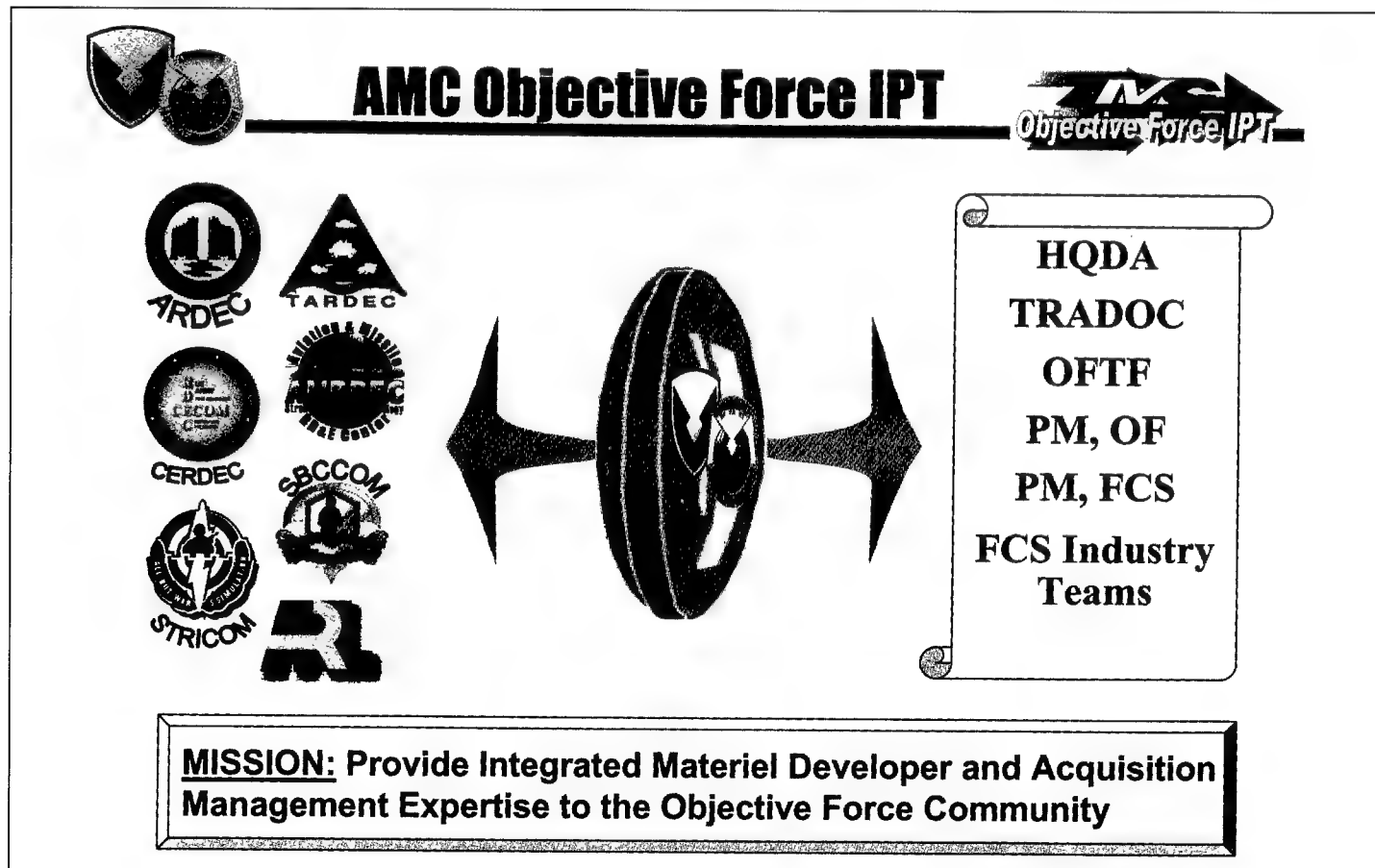


Figure 1.



Overarching CRADA



CURRENT CRADAs

- ✓ Non-standard RDEC arrangements
- ✓ Potential for conflicting language

GOALS

- ✓ Standardize the process
- ✓ Facilitate technology insertion and transfer
- ✓ Ensure equitable treatment for all contractors

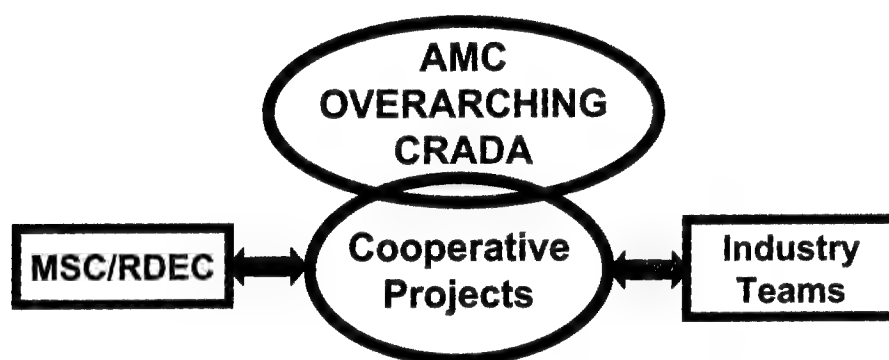


Figure 2.

the solicitation, the PM, FCS has organized a Primary Composition Team and a Staff Review Working Group to write and review the documents. AMC RDEC and OF IPT personnel are contributing members on both of these groups.

Conclusion

AMC is fully engaged and an active participant in the OF Program. To focus and expedite efforts on the Objective Force, the AMC Commanding General has established the TIB and the AMC OF IPT. The AMC OF IPT is developing three products to facilitate and integrate materiel development: a technical library, an overarching CRADA, and a risk-management program. AMC is also providing numerous personnel with acquisition expertise from both headquarters and

the RDECs who are integrated throughout the Objective Force community. AMC is committed to the Objective Force.

CHRISTOPHER S. RINALDI is the Chair of the AMC OF IPT on detail from the Tank-automotive and Armaments Command's Armament Research, Development and Engineering Center. He has a B.S. in mechanical engineering from Manhattan College, an M.S. in mechanical engineering from Rensselaer Polytechnic Institute, and is a registered Professional Engineer. Rinaldi is a member of the Army Acquisition Corps and is Level III certified in systems planning, research, development and engineering.

ALBERT S. WEDEMEYER is an AMC OF IPT member representing the Communications-Electronics Command RDEC. He is a graduate of the U.S. Military Academy, has an M.S. in industrial engineering from Stanford University, and is a registered Professional Engineer.

MICHAEL R. GALVAS is an AMC OF IPT member representing the Aviation and Missile Command RDEC. He has a B.S. in aeronautical and astronautical engineering from Purdue University and a master's degree in mechanical engineering from the University of Toledo.

WARFIGHTING DOCTRINE DEVELOPMENT

LTC Barry R. Hendricks
and LTC Walter H. Orthner

Introduction

Until it achieves the capabilities of the Objective Force, the Army will be a hybrid force comprised of many unit types at various levels of modernization. Our warfighting doctrine must account for these differences. It must also emphasize the distributed, noncontiguous operations required in Joint Vision 2020. It must address the complete range of potential tactical and operational missions and diverse operating environments. This includes open rolling terrain, close terrain, and the equally challenging complex urban terrain that has become the battlefield of choice for many adversaries. Most important, this doctrine must be comprehensive and embrace the full spectrum of military operations, providing a conceptual basis for the rapid transition, without loss of momentum, across the spectrum of operations. It must be relevant to Legacy Force units and adaptable to Interim Brigade Combat Teams and Objective Force units.

In the near term, the U.S. Army Training and Doctrine Command (TRADOC) is conducting an integrated rewrite of key Army concepts, doctrine, and strategic plans to address full-spectrum operations in the joint, interagency, and multinational environments. TRADOC will focus on doctrine and warfighting concepts that enable joint synergy to maxi-

mize lethality and survivability. Joint capabilities for precision maneuver and engagement, particularly the engagement of moving ground targets, will demand concepts and associated capabilities for joint, real-time, fully integrated sensor-to-shooter links and exponential advances in the Army's precision engagement capabilities.

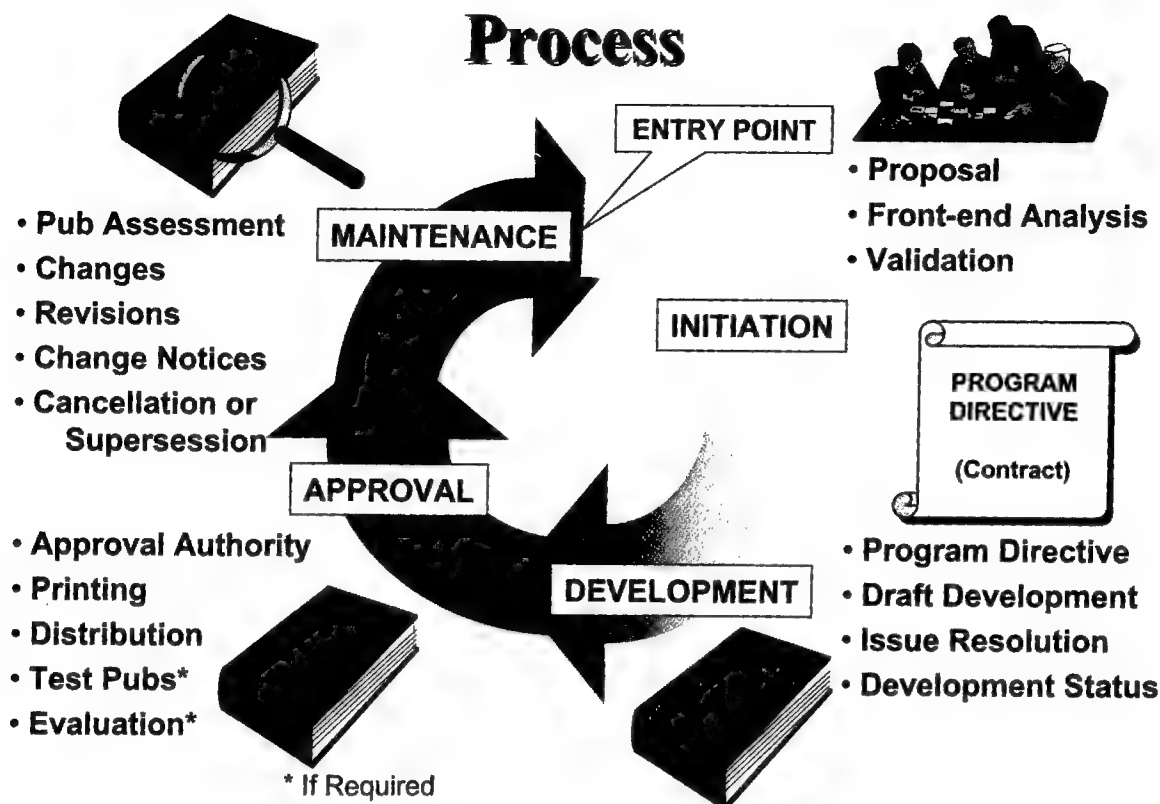
Doctrine provides military organizations a common philosophy, language, purpose, and unity of effort. It provides insight and wisdom gained from our collective experience with warfare and is the body of thought on how the military fights in the present to near term with current force structure and materiel.

Background

Doctrine provides military organizations a common philosophy, language, purpose, and unity of effort. It provides insight and wisdom gained from our collective experience with warfare and is the body of thought on how the military fights in the present to near term with current force structure and materiel.

The Army's warfighting doctrinal field manuals (FMs) provide the foundation for our operating principles and are designed to serve the units in the field today while looking toward the requirements of the future. They help commanders determine the proper course of action under circumstances existing at the time of decision and establish a common perspective from which to plan and operate. On June 14, 2001, the doctrinal foundation for the Army transformation was firmly established with the publication of FM 1, *The Army*, and FM 3-0, *Operations*. These FMs map the course on how the Army will fight and train for the next 5 to 7 years as we move toward the Objective Force. Across the Army, various doctrinal proponents are reviewing and rewriting FMs to ensure every tactic, technique, and procedure (TTP) can be traced and crosswalked to these two new manuals. These two manuals also mark the transition to the new FM numbering

Doctrine Development Process



system that will align Army manuals with joint Service manuals.

Doctrine Hierarchy

Army warfighting doctrine is organized in a three-tiered hierarchy that provides a structure for developing and implementing doctrinal publications. Tier 1, *Army*, is the highest-level tier and includes publications that offer a broad perspective on Army operations. There are 132 Tier 1 FMs including FM 1 and FM 3-0. Tier 2, *Proponent*, is the second tier, and it is designed to capture the bulk of proponent-level FMs. There are currently 227 Tier 2 FMs and they include all the proponents' principal doctrinal publications along with FMs covering functions, units, and the employment of soldiers and systems. Tier 3, *Reference*, is the final tier, and it contains information that seldom changes and could apply to any soldier or

unit. There are currently 132 Tier 3 FMs and they include tasks such as providing first aid, physical training, and marksmanship.

Doctrine Development

The development of the Army's warfighting doctrine follows a formal, traditional, and time-consuming process that requires careful planning and continuous coordination. The development process may take 18 to 24 months to produce the finished product. Numerous tasks are involved including research, analysis, writing, editing, internal and external staffing, and approval. This timeline varies depending on whether the FM is being newly written or revised, the scope and complexity of the material, the extent of the staffing/review required, and the level of the approval authority. The six phases are assessment, planning, development,

production, print and dissemination, and implementation and evaluation.

Once published, the new or revised doctrine will be integrated into the proponents' training plans. Tactical units implement the doctrine and provide feedback and recommended changes to the proponent. Finally, the combat training centers and the Center for Army Lessons Learned conduct assessments of the doctrine. The normal shelf life for doctrinal publications is 5 years. At a minimum, 36-48 months following publication date, proponents will conduct a formal review of their FMs. The purpose is to assess the usefulness and accuracy of the doctrine, which may lead to additional changes.

Transformation Doctrine

To support the Army transformation, TRADOC is facilitating the development of doctrine on the

familiar three axes of the Army transformation under the provisions of the final draft of TRADOC Regulation 25-36, *The TRADOC Doctrinal Literature Program*. Along the first axis, TRADOC is developing TTPs for the Initial Brigade Combat Team. Along the second axis, TRADOC is revising division and corps doctrine to link it with joint and multinational doctrine. Finally, along the third axis, TRADOC is revising existing Army doctrine in accordance with the *Doctrine Master Plan*, which is a prioritized listing of all Army, joint, multi-Service, and multinational doctrine maintained by the TRADOC Deputy Chief of Staff for Doctrine and used to obtain and prioritize limited resources for doctrine development.

The recent publication of FM 3-90 (formally 100-40), *Tactics*, and the publication of other key doctrinal publications in the very near future expand on the doctrine in FM 1 and FM 3-0, and contain key concepts of the Army vision that set the stage for the Army transformation. These other publications include FM 3-91 (formally 71-100), *Division Operations*; FM 3-93 (formally 100-7), *Decisive Force: The Army in Theater Operations*; FM 4-0 (formally FM 100-10), *Combat Service Support*; FM 5-0 (formally 101-5), *Army Planning and Orders Production*; and FM 6-0 (formally 100-34), *Command and Control*. As revisions to these publications become necessary around 2006 or 2007, the effort for developing Brigade Combat Team doctrine will merge with the need to execute the *Doctrine Master Plan*. Thus, transformation tenets will be incorporated into fundamental publications to reflect transformed doctrine as we move to the Objective Force.

The various TRADOC proponent schools and centers are developing Initial Brigade Combat Team doctrine and TTPs using the initial force operations and organizations as a framework. The doctrinal material consists of a small set of core publications (Tier 1) to guide the training and early organizational refinements

of the Initial Brigade Combat Team. It also consists of follow-on doctrinal publications (Tier 2) that support the core publications derived from unit training, lessons learned, and unit feedback. The management of Tier 2 doctrine is decentralized to proponents who determine timelines, content, and scope.

Division and corps doctrines are being revised to address the command and control and support requirements of the Initial Brigade Combat Team. This will provide the requisite "hooks and links" for joint and multinational operations. Army doctrine must not only be compatible, but also be embedded in current and emerging joint and multinational doctrine that addresses the capabilities of the Initial Brigade Combat Team, and eventually the Objective Force. Development of division doctrine continues, and corps doctrine will surely follow pending the approval of the interim division operations and organizations and the corps redesign, currently scheduled for FY04.

The Army vision, announced by Army Chief of Staff GEN Eric K. Shinseki in October 1999, gave TRADOC the opportunity to incorporate key concepts of that vision into doctrine. As the Army transforms, Initial Brigade Combat Team doctrine will eventually be integrated into the *Doctrine Master Plan*, at which point the key concepts will be included in all publications and become transformed doctrine.

A total of 26 Tier 1 Initial Brigade Combat Team initial draft field manuals were produced by the proponent schools and centers and delivered to Fort Lewis, WA, in the spring of 2000. The Initial Brigade Combat Team is testing and providing input on these doctrinal publications, which will help develop and refine future doctrine. These doctrinal manuals are scheduled for final staffing the first half of 2002. Currently, the division and corps doctrines have progressed far enough in their development process where effective and feasible

corresponding drafts are being produced. These drafts will be staffed, subsequently approved, and used as a guide in the architecture process prior to ratifying the Initial Operational Capability of the first Brigade Combat Team (projected for May 2003). This ratification will allow for meaningful support and focused training, and will establish deployment capabilities mandated by the stated Army vision.

Conclusion

The Army's future doctrine must enable core warfighting capabilities while increasing strategic responsiveness and dominance over an expanded range of mission environments and threats. As such, efforts to shape Army doctrine will continue throughout the mid- and far term. By the midterm, we will reform our doctrinal development process so that it continues to reflect the best available thought on the art and science of military operations. In the far term, this process will ensure that an integrated rewrite of fundamental doctrine is accomplished to provide relevant warfighting doctrine for the Objective Force.

LTC BARRY R. HENDRICKS is a Doctrine Staff Officer in the Office of the Deputy Chief of Staff for Doctrine, TRADOC Headquarters. He received a B.B.A. from North Georgia College and an M.A. from West Virginia University. He is also a graduate of the Command and General Staff College.

LTC WALTER H. ORTHNER is a Doctrine Staff Officer in the Office of the Deputy Chief of Staff for Doctrine, TRADOC Headquarters. He has an M.S. in logistics from the Florida Institute of Technology and is a graduate of the Command and General Staff College.

Introduction

Advances in weapon lethality, as envisioned for the Objective Force, have traditionally necessitated the development of heavier or more technologically advanced armor to protect the warfighter. However, to meet its strategic goals, the Objective Force must provide lethal combat overmatch with less weight and greater agility. This requires the Army to move from a platform-centric to a network-centric architecture, providing greater situational awareness. This situational understanding, along with greater mobility, more lethal precision weapons, and integrated joint capabilities, will obviate the Army's traditional reliance on heavy armor for force protection. Multifunctional weapon systems within Future Combat Systems (FCS) are key, but the real revolution in warfighting brought about by the Objective Force is the integrated, multi-tiered command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) network. Battles will be won or lost based on the network's ability to provide the situational picture allowing the commander to see and understand first.

A Different Architecture

C4ISR architecture for the Objective Force will be substantially different from the architecture of today's tactical communications infrastructure. Current architectures rely on a stable, semifixed supporting infrastructure established on elevated terrain. Relocating elements (signal nodes) of this infrastructure is not trivial and often results in lengthy periods of degraded communications. During these periods, the commander risks losing touch with the flow of the battle. The Army science and technology community is developing new technologies supporting command and control (C2) on-the-move. These technologies will free commanders

from today's rigid infrastructure and allow them to focus on the battle. Commanders will be able to roam the battlefield at will, continually maintain situational awareness data feeds, and effortlessly direct subordinate commanders.

The architecture of the Objective Force C4ISR network will include mechanisms for graceful degradation, dynamic reallocation of spectrum and bandwidth, information assurance, authentication, and autoconfiguration. It will be high-bandwidth, long-range, robust (e.g. anti-jam), secure (anti-hacker), and covert. The FCS will also depend heavily on the C4ISR network tying together its major functional areas of direct fire, indirect fire, infantry assault, intelligence, and reconnaissance. The architecture will enable collaborative fires (both direct and indirect) and reduce sensor-to-shooter timelines. The Objective Force Unit of Action will have organic C4ISR assets that permit unrestricted operations anywhere in the world. The network must be of sufficient reliability and robustness to permit simultaneous multiuser and multiprecedent connectivity. Obviously, as with the earlier commander's scenario, such connectivity requires terrain-

C4ISR ARCHITECTURES

The Objective Force Key Enabler

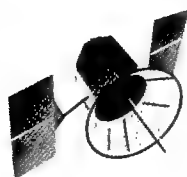
Steve Klynsmas and
MAJ Thomas Scott, UK

independence. Therefore, the Objective Force C4ISR architecture will include satellite and airborne communication nodes, as well as the more traditional terrestrial links, providing network connectivity and range extension.

The Objective Force will operate in a geostrategic environment encompassing a trend toward a nonlinear, multidimensional battlespace. The emphasis will not only be on joint interdependence and combined interoperability, but also on an inherent capability to interact with non-governmental organizations, private volunteer organizations, and indigenous infrastructures. Internettted "systems-of-systems" that operate seamlessly across the tactical, operational, and strategic levels will be key, including a robust and large reach-back capability that enables split-based operations. CONUS-based "sanctuaries" will facilitate interagency collaboration while providing a portal to the tactical arena. Command, control, communications, and computers (C4) information technologies thus arguably become the most significant common denominators across all the technologies and concepts being considered for the Objective Force.

C4ISR Functional Areas

Indirect Fire Function



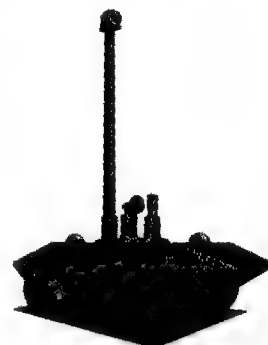
**Organic and Inorganic
Reconnaissance, Surveillance, and
Target Acquisition**



**Networked Command &
Control**



Direct Fire Function



Sensor Function



Infantry Carrier Function

Infrastructure

To understand and manage the complexity of the networks required for the Objective Force, the Army is beginning to document the architectural infrastructure supporting it. Architectures provide a mechanism for understanding and managing complexity. The DoD C4ISR Architecture Framework Document Version 2.0 defines architecture as “*the structure of components, their relationships, and the principles and guidelines governing their design and evolution over time.*” C4ISR architecture provides for the examination of processes and system implementations in the context of mission operations and information requirements. Architectures are generally composed of three specific views, which to be consistent and integrated, must have explicit linkages between them. Such

linkages are also needed to provide a cohesive audit trail from integrated mission operational requirements and measures of effectiveness to the supporting systems and their characteristics, and to the specific technical criteria governing the acquisition and development of the supporting systems. The three typical architecture views are as follows:

- The *operational view* describes the tasks and activities, operational elements, and information flows required to accomplish or support a mission or functional area. Operational views are generally independent of organization, force structures, and technology.

- *System views* depict the functional and physical automated systems, nodes, platforms, communication paths, and other critical ele-

ments that support the information-exchange requirements and war-fighter tasks described in the operational architecture views.

- The *technical view* is the minimal set of rules governing the arrangement, interaction, and interdependence of system parts or elements. Technical views facilitate integration and promote interoperability across systems and compatibility among related architectures. Essentially, they prescribe the technical implementation standards and conventions—such as building codes—on which the architecture depends.

Grids

C4ISR architecture will form the backbone of the FCS and the Objective Force and will enable the effective application of all other capabilities, including operational movement

and maneuver, tactical maneuver, vertical envelopment, mobile strike, and close combat. The Objective Force C4ISR architecture will need to encompass logical sensor, information, and engagement grids, which are internettted via a physical communications grid to provide a virtual internettted C4ISR infosphere. This seamless integration at multiple levels will involve information exchange interfaces to support mission planning across echelons, sensor information for battlespace awareness, and beyond-line-of-sight targeting.

The sensor grid will logically connect organic manned, unmanned, remote, platform, and soldier sensors along with nonorganic Army, joint, and coalition capabilities. A ubiquitous and robust sensor grid will contribute significantly to a more comprehensive and more accurate joint common operating picture, locate key enemy capabilities for destruction, enable reliable battle damage assessment, and enhance the ability of the commander to employ forces more effectively. Improved situational understanding provided by the sensor grid will also strengthen survivability and force protection, allowing the force to preserve combat power.

The information grid will logically provide commanders at all echelons with sophisticated battlespace management tools and capabilities to transform battlespace awareness and understanding into executable actions. Advanced C4ISR capabilities, including automated decision aids and collaboration tools, will enable commanders to make qualitatively better decisions faster than the enemy, thus thwarting the enemy's ability to respond.

The engagement grid will leverage enhanced battlespace awareness, engagement quality target information, distributed battle damage

assessment sensors, and shared knowledge of the commander's intent to plan and execute synchronized lethal and nonlethal effects on the adversary. Like the sensor and information grids, the engagement grid is a logical construct enabling coordinated and collaborative fires, dependent on the communications grid.

The communications grid will provide a ubiquitous "always-on" virtual back-plane to support communications among all battlefield entities. Extended range and redundant communication networks will expand the commander's reach and ensure continuous connectivity via multiple pathways. The global information infrastructure in which the Objective Force will function must provide ubiquitous data transport and information to the warfighter, independent of location, degree of mobility, or platform dynamics. The information infrastructure will use a heterogeneous mixture of available media including civilian fiber optic cable plants; landlines; and terrestrial, airborne, and satellite-based wireless services. This infrastructure will likely be a mix of both civilian and military systems. The communications grid will be supported by the emerging Warfighter Information Network-Tactical and the Joint Tactical Radio System.

Conclusion

The C4ISR architecture must provide for the integration of all these systems into a seamless, dynamic, and extensible information transport system that is scalable and has security appropriate to the military mission and the information warfare threat. A C4ISR architecture provides the only truly integrating mechanism for the Objective Force information requirements discussed. It incorporates information technol-

ogy consistently, controlling the configuration of technical components and ensuring compliance with technical "building codes" through the use of interdependent views. The development of this architecture will be evolutionary as concepts and technology increase in fidelity over time. The multilevel C4ISR architecture will provide an essential mechanism for understanding and managing the extremely complex requirements, standards, and implementation details of the Objective Force.

STEVE KLYNSMA is a Lead Network Engineer working for The MITRE Corp. in support of the Army Office of the Director of Information Systems for Command, Control, Communications, and Computers. He graduated from the U.S. Military Academy in 1983 and has an M.S. in communications and computers from The George Washington University.

MAJ THOMAS SCOTT is the United Kingdom (U.K.) Exchange Officer in the Office of the Director of Information Systems for Command, Control, Communications, and Computers. He was educated at Glasgow University, Cranfield University, and Kings College London. He has a B.S. in mechanical engineering with a specialization in engineering management, an M.S. in the design of information systems, and an M.A. in defense studies. He is also a graduate of the U.K. Joint Services Command and Staff College.

COMBAT SUPPORT AND COMBAT SERVICE SUPPORT TRANSFORMATION

Sowing Seeds For The Objective Force

LTC Brian R. Layer

Introduction

Objective Force operations will deviate dramatically from present-day operations. Support and sustainment operations must change dramatically to support the operational reach and increased tempo of maneuver forces that conduct decentralized operations throughout the extended battlespace. This effort requires that we break from business as usual and attack our deployment, support, and sustainment efforts in new and different ways. The success of the Objective Force depends on the seeds we sow today in the combat support (CS) and combat service support (CSS) transformation.

Not Business As Usual

CS/CSS transformation will dramatically change the way our Army is supported and sustained as part of a joint force. CS/CSS transformation must ensure that Army forces are capable of deploying rapidly to support current and future operational force deployment goals and can effectively support and sustain the full spectrum of synchronized joint Army operations. To achieve this, we must enhance strategic responsiveness and meet deployment timelines; reduce the CS and CSS footprint in combat zones; and finally, reduce the

cost of generating and sustaining forces without reducing warfighting capability or readiness.

We know that some things will not change. As always, joint force commanders will get what they deserve—better support than their adversaries. Performance will still be judged based on the ability to provide the right stuff at the right time and place. We will continue to project forces to trouble spots around the world, and our national economic overmatch will fuel that effort; however, some things must change.

Our past systems were inefficient. Joint force commanders (JFCs)

traded agility and freedom of maneuverability for their world-class support. Reliance on a large logistics footprint and the operational burden of its protection forced JFCs to temper their appetite in terms of distance, intensity, and operation duration. In addition, the size of the supporting and sustaining forces reduced force closure because of additional strategic lift requirements.

Logistics Vision

The Army Chief of Staff's logistics vision states, "In terms of sustainability, the logistics footprint will be reduced. For this to occur, the numbers of vehicles deployed must be controlled, reach capabilities must be leveraged, weapons and equipment designed in a systems approach, and projection and sustainment processes revolutionized."

If the Army is to realize the full potential of this vision, it must address three factors. First, the Army must invest in equipment that is more reliable and consumes fewer resources. Second, the Army must replace its inventory-based sustainment culture with a distribution-based system that allows commanders to maneuver with only what they need for a particular mission, free of excess. Finally, sustainment forma-

*The Army must overcome
the tyranny of physics.
We must use science
and technology
and our associated
acquisition process
to procure more capable
and less demanding
equipment.*

tions will have to change to accommodate this new logistics system.

The Physical Change

The most challenging factor involves equipment. The Army must overcome the tyranny of physics. We must use science and technology and our associated acquisition process to procure more capable and less demanding equipment. In other words, no reduction in sustainment footprint will come without a reduced demand for supplies. To address this problem, the Army must change the criteria used to acquire new equipment. The costs associated with sustainment must be balanced with the costs of acquisition so that avoidable sustainment costs are averted during the procurement process rather than paid for, like a tax, by the operational force. For instance, we may pay more for a family of ultrareliable systems with common components and embedded diagnostics/prognostics, but this will avoid operating costs and reduce the footprint downstream. More important, the Army must explore and invest in more efficient technologies. Future systems must be smaller, lighter, more reliable, capable, and survivable.

A Paradigm Shift

The next factor that must be addressed is the cultural shift from an inventory to a distribution system. Timely, reliable information is the backbone of this system. As sustainment operations become more precise, our reliance on assured communications and powerful information systems becomes a prerequisite rather than a luxury. The need for total asset visibility is absolute because as safety stocks decline, correct information becomes a safety net. The distribution system must be linked to maneuvering-unit operations and provide logistical situa-

tional understanding, total asset visibility, actual and projected consumption rates, and positive control to end users from all sources.

Completing The Puzzle

Information alone, however, won't deliver the goods. An agile, efficient transportation system is also required. The operational force is designed to fight over greater distances. While this alone drives an increasingly vertical distribution system, the nonlinearity of the future fight accentuates this need. Reduced inventory requires an efficient distribution system that allows appropriate packaging at the national or intermediate staging base for delivery through the distribution system without repacking. This means that commonality must be designed into our transportation systems regardless of mode.

The final factor—organizational redesign—results from the success of the first two. Reducing demand and employment of a distribution-based system will enable the Army to field different, smaller, more-efficient sustainment formations that enable the combat force to accomplish missions without reducing JFC options. However, for this to become a reality, the Army must do the following:

- Develop a deployment infrastructure to meet stated deployment timelines—a brigade in 96 hours, a division in 120 hours, and five divisions in 30 days—wherever Army forces are stationed;
- Develop improved strategic mobility platforms that allow combat formations to deploy from their CONUS or intermediate staging bases;
- Develop air-transportable platforms capable of rapid relocation by in-theater lift assets;
- Develop transportation systems that rapidly traverse the extended battlespace;

- Enhance installation capabilities to project and sustain forces using split-based operations;

- Develop unitized and modular forces that can deploy directly into operations with minimal or no reception, staging, onward movement, or integration;

- Develop alternative theater opening capabilities that enable and improve over-the-shore logistics as well as airfield development and enhancement;

- Reduce system weight and cube of systems while increasing survivability and improving deployability;

- Reduce power and energy requirements;

- Develop systems with real-time diagnostics and prognostics that support higher operational readiness of all systems;

- Develop ultrareliable and fail-safe designs that reduce unanticipated equipment failure; and

- Develop systems that are interoperable with other Army, joint, and multinational systems.

Conclusion

The Objective Force requires a change in how the Army fights on future battlefields. To achieve this, the Army must change how it conducts business today. The CS/CSS transformation enables it to do just that.

LTC BRIAN R. LAYER is the Branch Chief for CS/CSS Transformation, Office of the Army Deputy Chief of Staff for Logistics. He received a B.A. from the U.S. Military Academy and an M.A. from Michigan State University. He also holds an M.M.A.S. from the Army Command and General Staff College.

THE VIRTUAL PROVING GROUND

LTC Mike Landers

First Sighting Of The Objective Force ... In Our Cyber Sandbox

Introduction

The U.S. Army Simulation, Training and Instrumentation Command (STRICOM) provides training, testing, instrumentation, and simulation solutions to the Objective Force. Whether modeling new concepts, virtual prototyping of capabilities previously only envisioned, developing tools to facilitate testing of new concepts, or providing training products and services, STRICOM supports the development and deployment of the Objective Force.

Organization

STRICOM is organized around the virtual, constructive, live simulation, and testing domains and has four project managers (PMs) and two specific directorates.

The PM for Combined Arms Tactical Trainers (PM, CATT) focuses on virtual training simulations. PM, CATT provides focused management of the Close Combat Tactical Trainer (CCTT) and support to the U.S. Special Operations Command. The CCTT consists of combat vehicle simulators and emulators operating interactively in a combined-arms synthetic environment representing a battlefield on real-world terrain.

Another product is the Aviation Combined Arms Tactical Trainer – Aviation (AVCATT-A) reconfigurable manned simulator. AVCATT-A is an aviation company/team collective trainer providing the warfighter a mobile, transportable combined-arms synthetic environment where aviation and ground maneuver units train as they will fight—as a team.

The Engagement Skills Trainer (EST) 2000 is a laser-based, small-arms indoor training range that supports training and evaluation of individual marksmanship and of soldiers in judgmental use of force (shoot/don't shoot)

scenarios. The EST 2000 is transportable for use by units deploying overseas in peacekeeping, stability, and support operations.

The AC-130U Aircrew/Maintenance Training Device and Testbed is a virtual simulator that supports initial qualification, currency, and mission-specific training of AC-130U aircrews and malfunction-troubleshooting training of both AC-130U aircrews and avionics maintenance technicians.

Simulation

The PM for Warfighters' Simulation (PM, WARSIM) focuses on constructive simulations. In partnership with the National Simulation Center, PM, WARSIM develops and sustains constructive simulations. These simulations primarily support the Army's command and staff training requirements, from company/battalion command and staffs through echelons above corps and joint task force levels, across the full-mission spectrum (stability and support operations through mid- or high-intensity conflict). WARSIM is the next-generation computer-based command and control constructive simulation training system that will eventually replace corps battle simulation.

An integral component is the lower level constructive simulation, One Semi-Automated Forces (OneSAF). OneSAF are compatible, next-generation computer-generated forces, from entity up to brigade level, supporting all modeling and simulation (M&S) domains with an emphasis on human-in-the-loop and non-human-in-the-loop.

Tactical Simulation (TACSIM) is an intelligence training simulation system that provides warfighters a single robust intelligence simulation model. TACSIM provides simulated intelligence

collection and reporting through user organic communications and processors.

The Digital Battlestaff Sustainment Trainer collectively simulates tactical situations and resultant message traffic to stimulate the command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) systems in a unit's tactical operations center.

Virtual Training

The PM for Training Devices (PM, TRADE) is the Army Materiel Command (AMC) executive agent for all instrumentation and Tactical Engagement Simulation Systems (TESS) at the maneuver combat training centers (National Training Center, Joint Readiness Training Center (JRTC), and the Combat Maneuver Training Center), soon to expand to our home-station training as well. The PM is responsible for training systems and instrumentation to support live-fire ranges and Military Operations on Urbanized Terrain (MOUT) home-station and deployed units. Products include the following:

- **Multiple Integrated Laser Engagement System 2000**—an integrated laser-based training system that provides commanders direct-fire force-on-force training for individuals, vehicles, and weapons.

- **JRTC MOUT-Instrumentation System (JRTC MOUT-IS)**—provides automated data collection and feedback, command and control of MOUT exercises, and interactive target systems to support a battalion-size force.

- **The Live Environment Training Systems Strategy**—encompasses a "system-of-systems" to be used in conducting future live training. This will include a set of standards and architectural guidelines to enable development

of flexible, effective, interoperable, and maintainable live-training products such as TESS and live training instrumentation (LTI). It will also include interfaces with the virtual and constructive domains, giving this system an across-the-board training capability. The common training instrumentation architecture is the enabling architecture that specifies the components and interfaces for all LTI products and establishes the standards for development, test, and deployment of those components.

The PM for Instrumentation, Targets and Threat Simulators (PM, ITTS) manages major ITTS required for technical and operational test and evaluation as well as operates and maintains the targets for test and training for the U.S. Army. Products and services include the following:

- **Mobile Automated Instrumentation Suite**—the live instrumentation suite supporting operational and force development testing of current and future weapon systems.

- **Threat Simulator/Simulation Program Plan**—a process co-chaired by the AMC Commander and the Army Acquisition Executive that provides a means to identify and compile total Army requirements for threat materiel solutions.

- **Virtual Targets Program**—creates highly detailed, 3-D geometry models for use in M&S. These virtual targets are typically created by collecting data from actual hardware to produce a high-fidelity model that can be used in radar-signature analysis and in a wide range of other simulations.

STRICOM's Operations and Support Directorate is devoted to soldier warfighter tools in every aspect. This directorate provides program management for life-cycle support and operations. It also plans and manages an integrated logistics support and materiel readiness program to support development and fielded systems. Logistics and operational support encompass traditional elements of logistics plus "turn-key" operations for training systems and combat training centers. Readiness includes those efforts mentioned above and procurement, reprourement, modification, and life-cycle management of fielded

equipment. The sun never sets on this directorate when it comes to providing support to operational commands.

STRICOM's Engineering Directorate plans, manages, and executes an integrated life-cycle modeling, simulation, and instrumentation engineering program for the command. This program includes technology-based research, front-end analysis, design, testing, production, fielding, and post-deployment. Additionally, the directorate manages the horizontal technical integration process across command programs or products and serves as the technical lead for research, process management, and integration of the advanced distributed simulation environment.

A key facility operated by the Engineering Directorate is the Central Florida Technology Development Center (CFTDC). The CFTDC is a multiuse research and development facility comprised of the Innovation Center and the M&S Testbed. The Innovation Center is a multimedia facility used for demonstrating M&S technologies, distance learning, and team building among joint Service, Army, federal, state, academia, and national and local industrial partners. The M&S Testbed is a reconfigurable, interoperable laboratory for exploring distributed simulation technology and conducting experiments related to Army-approved science and technology objectives.

The Road Ahead

Future training environments are not simply devices or infrastructure, but a blend of necessary training capabilities permitting the future commander to take training to soldiers, wherever they are. It means embedded simulations, reachback capabilities, and a necessary link to a support structure geared to soldiers receiving training where they need it instead of "going to training." The common training instrumentation architecture will permit interoperability of legacy systems with the emerging embedded simulation needs of the Objective Force. OneSAF ensures interoperability between the Army's next-generation virtual simulator (CCTT) and constructive simulation (WARSIM). The Live Environment Training Strategy is the bridge from live to virtual and constructive simulations with TESS and LTI. The Army Test and Training Inter-

operability Conference, chaired by the PM, ITTS, works solutions from the ground up for integrating test and training equipment, standards, and architecture.

Interoperability

STRICOM emphasis on the Objective Force is not limited to products and services. The Product Manager for Simulation Technology Integration (PM, STI) has two focus areas: requirements integration and Army transformation. This office will facilitate support to customers by coordinating integrated requirements across the command. Working relationships with the combat and training development community will provide the command an Objective Force focus through an organization specifically dedicated for that purpose.

Another STRICOM organization emerged from the outset with a future capabilities mindset. On Aug. 18, 1999, the U.S. Army awarded a 5-year contract to the University of Southern California to create the Institute For Creative Technologies (ICT). ICT's mandate is to enlist the resources and talents of the entertainment and game development industries and to work collaboratively with computer scientists to advance state-of-the-art training simulation. The talents of ICT members and visionaries in the entertainment industry have already provided an environment from which to launch a variety of concepts. These concepts range from animated representations of new equipment or system possibilities to glimpses of potential interactive training environments with "synthespians" (synthetic actors powered by artificial intelligence engines and graphics of photo-real quality), all with a goal of an environment that can make the soldier sweat.

Conclusion

STRICOM is prepared to support the Army's training, testing, instrumentation, and simulation needs for transformation to the Objective Force.

LTC MIKE LANDERS is the Product Manager, STI at STRICOM. He holds a master's degree in systems technology (CAI) from the Naval Postgraduate School and a bachelor's degree in business (marketing) from Georgia College.

Opportunities Abound . . .

THE AAC ANNUAL TRAINING WITH INDUSTRY ORIENTATION WORKSHOP

Sandra R. Marks

Introduction

What can one expect to gain from participation in the Army's Training With Industry (TWI) Program? On July 13, 2001, 12 Army Acquisition Corps (AAC) officers—all just beginning the TWI Program—had this and other questions answered at the 4th annual AAC TWI Orientation Workshop in Springfield, VA. The purpose was to acquaint participants with the intricacies of the TWI Program. Other attendees included outgoing TWI participants and senior personnel from the Acquisition Career Management Office (ACMO), Office of the Assistant Secretary of the Army (AL&T), and the U.S. Total Army Personnel Command's Acquisition Management Branch (AMB). Also included for the first time since these orientations began were representatives from several of the participating industries.

Program Background

Initiated in the 1970s, the Army's TWI Program is a work-experience training opportunity that takes selected officers out of their military environment for 1 year and exposes

them to the latest civilian business practices, organizational structures and cultures, technology development processes, and corporate management techniques. The result is an opportunity to broaden one's career and to strengthen technical competency, problem-solving skills, and leadership abilities.

Opening Remarks

Jim Welsh, AAC TWI Program Proponency Officer in the ACMO, and orientation host, introduced COL Frank C. Davis, Deputy Director for Acquisition Career Management and ACMO Director, and LTC Tom Hogan, Chief, AMB, for opening remarks. Both stressed the value of the TWI Program in expanding an officer's professional development and knowledge. Their remarks set the tone for the workshop by demonstrating that the acquisition leadership is committed to the TWI Program. Davis specifically outlined some of the unique opportunities provided by the TWI Program and urged program participants to learn as much as possible during their corporate assignments. The responsibility

for success, he added, is on participants. As such, he called on them to have an open mind, ask questions, and gain an understanding of how industries function in a variety of areas such as program management, contracting, and test and evaluation.

Hogan reminded officers of the leadership skills they bring to the TWI position. He also urged the new participants to make the most of their year with industry and to use the TWI experience to improve their value to the Acquisition Corps.

IDPs

MAJ Cris Boyd, ACMO Proponency Officer and Chief, Information Management Team, reviewed procedures for maintaining one's Individual Development Plan (IDP), a critical document for identifying and tracking career objectives. In addition, the IDP is used to update continuous learning points earned through attendance at seminars or conferences and participation in other professional activities. He emphasized the need to work closely with one's supervisor in career planning and in developing education,

training, and experience goals. Boyd concluded by summarizing the certification process and listing AAC membership requirements.

Personal Perspective

MAJ Leslie L. Lewis, an FY00 TWI participant, gave an insider's perspective on her experience, offering ideas on what to expect and what to do to get the most out of the program. Lewis recently completed her TWI tour as a Product Manager in the International Data Services Division of AT&T Solutions in Bridgewater, NJ. She said that prior to beginning her assignment, she had no idea of the magnitude of what she had to coordinate or the scope of her responsibilities. She was also apprehensive about her reception by the company's civilian workforce. Lewis took the advice of her FY99 predecessor and used the 90-day introductory period to interface with the account managers, salespeople, marketing and contracting representatives, engineers, and other managers she would be working with at AT&T. She found that people valued the opportunity to provide information.

Lewis offered a few recommendations for getting the most out of the TWI Program: Realize you're not going to change anything; let your supervisor know what you might want to do and what you expect to gain from your experience there; be open to new challenges and new ideas; ask for the hard jobs; and don't get bored. She concluded by stating that the 12-month tour goes fast! The program, she added, is really what you make of it. MAJ Lewis enthusiastically endorsed the program and the opportunity to work in the corporate world.

Ethical Considerations

Al Novotne, a lawyer in The Office of The Judge Advocate General, HQDA, provided some guidance

on ethics and standards of conduct. He began by reminding program participants that they are trainees, not official Army representatives. He covered such areas as "unauthorized commitments" that could compromise the Army's position and "inside info" that is not available to the public. Referencing several U.S. codes, he also offered advice on copyrights, patents, and intellectual property. Novotne concluded with a summary of the rules governing gifts, awards, and bonuses from TWI hosts.

USASD Overview

CPT Sheila E. Campbell, Commander, U.S. Army Student Detachment (USASD) at Fort Jackson, SC, provided an overview of the detachment's mission, organization, and activities. She highlighted USASD's role in providing high-quality financial and personnel support for officers selected to participate in the TWI Program. The USASD is basically a personnel action center for in-processing, outprocessing, financing, budgeting, civil schooling, tuition, and textbooks.

Connie Scott-Blue, primary Agency Program Coordinator for USASD, presented an information briefing on the use and benefits of the government travel charge card. She outlined the application process, types of accounts and available card designs, card limits, and cardholder responsibilities.

Reporting Responsibilities

Paula Bettes, Acquisition TWI Manager at AMB, summarized procedural considerations associated with the TWI Program. She began with an outline of the program, the selection criteria, and the selection process. Bettes also outlined procedures for submitting interim training reports that document progress in achieving training objectives, final training reports that summarize the

ability to meet one's objectives, TDY requests, and academic evaluation reports.

TRICARE Overview

The day's briefings concluded with a presentation by Eileen Mejia, Marketing Director, Northeast Section, TRICARE. TRICARE, formerly the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS), is the managed health care program for Active duty Service members, retirees, and their families. Mejia spoke about TRICARE Prime Remote, a new program to address the needs of Active duty personnel who are in assignments such as TWI that are geographically distant from traditional health care services at military installations. Mejia provided information on eligibility requirements, enrollment procedures, and benefits.

Conclusion

The orientation was termed a "great success" by the participants. In particular, they enjoyed attendance by industry representatives and being able to hear about the experiences and "lessons learned" from an FY00 TWI graduate. Next year's TWI orientation is tentatively scheduled for July 11-12, 2002.

SANDRA R. MARKS, an employee of Science Applications International Corp. (SAIC), provides contract support to the Army AL&T magazine staff. She has a B.S. in journalism from the University of Maryland, College Park.

THREAT MATERIEL SOLUTIONS FOR ARMY ACQUISITION

Introduction

If you are an Army weapon system program manager (PM) or a member of a research, development and engineering center (RDEC) concerned about the foreign threat to your program, then this article is for you. There is both a process and an Army organization in the acquisition community that provide the acquisition and testing communities with threat products (hardware and simulations) needed to satisfy their threat analysis and testing objectives. The process, entitled the Threat Simulator/Simulation Program Plan (TSPP), is chartered by the Army Materiel Command (AMC) and supported by the Army Acquisition Executive (AAE). The organization that provides threat materiel identified by the TSPP process is the Threat Systems Management Office (TSMO).

The TSMO

TSMO develops threat products and acquires actual foreign materiel in support of Army acquisition. TSMO is a management office under the PM, Instrumentation, Targets and Threat Simulators (ITTS). PM, ITTS is part of the Simulation, Training and Instrumentation Command (STRICOM), a major subordinate command (MSC) of AMC.

As the chartered threat materiel developer for the Army, TSMO is institutionally funded to develop and provide the Army acquisition and testing communities with threat products. In most cases, TSMO delivers the threat products it develops or acquires to the Army Test and Evaluation Command's (ATEC's) Threat Support Activity (ATSA). ATSA operates and maintains the threat systems and provides them for developmental and operational testing. Other simulator, foreign materiel, and simulation products developed by TSMO are either provided to various users or delivered to and maintained by the TSMO threat facility at Redstone Arsenal, AL. This facility allows users access to threat simulations via distributed methods for use in developmental testing, analysis, and experimentation.

Threat products, whether actual foreign equipment or hardware or soft-

Jeffrey L. Langhout

ware simulators, must be validated in association with the intelligence community as part of the threat development process. TSMO accomplishes the threat validation process through an established Army program supervised by the Test and Evaluation Management Agency (TEMA). Each threat validation effort is managed via a Threat Validation Working Group (VWG) chaired by TEMA. VWG membership includes representatives of the intelligence community and other appropriate stakeholders. A threat product validation report signed by TEMA and approved by the DOD Director for Operational Test and Evaluation ensures that threat products developed by TSMO accurately represent the threat.

TSPP

Now you know there is an organization that is chartered and funded to provide validated threat products in support of the acquisition community. But as a PM or RDEC manager, how do you get your threat materiel needs into the system? The answer is amazingly simple: interface with the TSPP process.

The purpose of the TSPP process is to identify and compile Army threat materiel requirements, clearly articulate and prioritize those needs, and champion them through the Army Program Objective Memorandum (POM) process. An integrated product team (IPT) chaired by the AMC Deputy Chief of Staff for Research, Development and Acquisition (DCSRDA) drives the annual TSPP process. The TSPP process was chartered by the AMC Commanding General (CG) and supported by the AAE in 1997, with PM, ITTS assigned as the Secretary. Voting membership includes one representative from each program executive office (PEO) and one representative from each AMC MSC.

Also included in the IPT are representatives from the Office of the Army Deputy Chief of Staff for Intelligence (DCSINT), the Training and Doctrine Command (TRADOC), and the ATEC.

IPT observers also include the Office of the Assistant Secretary of the Army for Acquisition, Logistics and Technology (OSAALT), the Office of the Army Deputy Chief of Staff for Operations and Plans (ODCSOPS), and TEMA.

Threat product requirements are normally collected via an annual data collection process. Data collection is achieved by onsite visits to project and product management offices and meetings with developer representatives in each PEO and in each of AMC's MSCs. Coordination for data collection is handled via PEO and MSC IPT members. Data are collected between February and July.

If you want to get your threat materiel needs into the TSPP process, you have two routes: Submit them during annual data collection or submit them to your PEO/MSO representative. If your threat materiel needs are identified in the TSPP, funds from the testing budget operating system can potentially be used to acquire or develop these threat products. Remember that the TSPP IPT compiles threat simulator/simulation needs and consolidates them into a prioritized list. This Army prioritization guides funding of threat products.

The TSPP provides an appropriate forum to ensure that all parties involved with the acquisition and testing of weapon systems play a role in determining threat product needs. The TSPP also provides a single voice for threat materiel requirements within the Army's research, development, and acquisition (RD&A) community. In addition, the TSPP process interfaces with the other Services to address potential duplication and seek funding from joint forums.

TSPP's Value

The value of the TSPP is fourfold. First, the TSPP process brings together program representatives, testers, and the intelligence community. This is important because the TSPP IPT process fills a gap in the Army acquisition process. Until the TSPP's inception, no standard procedure adequately tied together defined threats with Five-Year Test Program (FYTP) resourcing for the test and evaluation community's System

Threat Simulator/Simulation Program Plan

Purpose	Authority	Organization																								
<ul style="list-style-type: none">• Identify, compile, and prioritize Army threat materiel requirements supporting the acquisition community• Clearly articulate threat materiel needs to the Army staff• Champion threat materiel solutions through the POM process	<p>April 18, 1997, AMC CG directed:</p> <ul style="list-style-type: none">• AMC DCSRDA initiate and sustain the TSPP• PM, ITTS facilitate the TSPP <p>May 5, 1997, AMC DCSRDA directed:</p> <ul style="list-style-type: none">• Use of IPT process• IPT Executive Secretary to be the TSMO• AMC DCSRDA to be the IPT chair <p>May 9, 1997, AAE directed:</p> <ul style="list-style-type: none">• PEO participation as TSPP IPT members	<p>IPT</p> <p>AMC DCSRDA (Chair)</p> <p>Membership</p> <table><tr><td>TACOM</td><td>ATEC</td></tr><tr><td>AMCOM</td><td>PEO, Aviation</td></tr><tr><td>SBCCOM</td><td>PEO, AMD</td></tr><tr><td>CECOM</td><td>PEO, C3S</td></tr><tr><td>STRICOM</td><td>PEO, GCSS</td></tr><tr><td>ARL</td><td>PEO, IEW&S</td></tr><tr><td>AMSAA</td><td>PEO, Tactical</td></tr><tr><td>HQDA DCSINT</td><td>Missiles</td></tr><tr><td>HQ TRADOC</td><td></td></tr><tr><td>DCSINT</td><td></td></tr></table> <p>Observers</p> <table><tr><td>OASAALT</td><td>TEMA</td></tr><tr><td>ODCSOPS</td><td></td></tr></table>	TACOM	ATEC	AMCOM	PEO, Aviation	SBCCOM	PEO, AMD	CECOM	PEO, C3S	STRICOM	PEO, GCSS	ARL	PEO, IEW&S	AMSAA	PEO, Tactical	HQDA DCSINT	Missiles	HQ TRADOC		DCSINT		OASAALT	TEMA	ODCSOPS	
TACOM	ATEC																									
AMCOM	PEO, Aviation																									
SBCCOM	PEO, AMD																									
CECOM	PEO, C3S																									
STRICOM	PEO, GCSS																									
ARL	PEO, IEW&S																									
AMSAA	PEO, Tactical																									
HQDA DCSINT	Missiles																									
HQ TRADOC																										
DCSINT																										
OASAALT	TEMA																									
ODCSOPS																										

AMCOM: U.S. Army Aviation and Missile Command; AMD: Air and Missile Defense; AMSAA: Army Materiel Systems Analysis Activity; ARL: U.S. Army Research Laboratory; C3S: Command, Control and Communications Systems; CECOM: U.S. Army Communications-Electronics Command; GCSS: Global Combat Support System; IEW&S: Intelligence, Electronic Warfare and Sensors; SBCCOM: U.S. Army Soldier and Biological Chemical Command; TACOM: U.S. Army Tank-automotive and Armaments Command.

Evaluation Plan and Threat Test Support Packages. This is also true for FYTP resourcing of threat products identified in a program's Simulation Support Plan (SSP) and Test and Evaluation Master Plan. Too often, lack of documented procedures forces individual programs to shoulder common threat costs.

The second reason why the TSPP is valuable is because it provides a single prioritized view of the RD&A threat product requirements to senior Army leadership. Unfortunately, there are not enough dollars to develop or purchase every threat product requested. However, with a united ATEC, PEO, AMC, TRADOC, and intelligence effort relative to threat materiel needs, the acquisition community can make a stronger case for unfunded threat needs.

The third reason for the TSPP's value is that it confirms the intelligence community's position. Because the Army DCSINT and the TRADOC DCSINT are voting members, they and other intelligence community members can thoroughly review each threat product identified via the TSPP process. This gives the intelligence community an opportunity to either confirm the threat application or challenge whether

the need is still valid. This extremely important voice helps to ensure that the Army is spending its threat materiel dollars on needed products.

Finally, the TSPP is valuable because it helps to ensure that TSMO provides the right threat materiel to the right customers at the right time.

Maturation Of The TSPP

The TSPP process is in its fourth year of use and continues to be refined and improved. During the first few years, the PEOs and MSCs have come together in processing their threat materiel needs and in consolidating their priorities. ATEC, TRADOC, and the intelligence community became IPT members during the last year and have a key role in the continued success of the TSPP process. All TSPP IPT members realize the importance and significance of consensus among PEO, AMC, TRADOC, ATEC, and intelligence organizations.

Conclusion

The Army Materiel Command has a unique organization and process dedicated to ensuring Army weapon system developers, testers, and research per-

sonnel are provided with the threat materiel needed to support their programs. The TSPP provides the mechanism for the acquisition and testing community to get their needs into a formalized process that supports POM development for threat materiel. Finally, the TSPP provides a strong network of intelligence, acquisition, and testing professionals dedicated to ensuring Army weapon systems are developed and tested in proper threat environments.

JEFFREY L. LANGHOUT is Chief of the Business Development Office in the Threat Systems Management Office. He holds a Master of Science and Engineering from the University of Alabama, Huntsville, and a Bachelor of Industrial Engineering from Auburn University. He is a member of the Army Acquisition Corps and is Level III certified in both program management and systems planning, research, development and engineering.

THE FY02 ARMY POSTURE STATEMENT

On July 30, 2001, Secretary of the Army Thomas E. White and Army Chief of Staff GEN Eric K. Shinseki jointly presented the FY02 Army Posture Statement before the U.S. House of Representatives' Committee on Appropriations, Subcommittee on Defense. That statement, edited to meet space limitations in this magazine, is provided below. The entire document upon which the testimony is based, The Army Posture Statement, can be accessed at <http://www.army.millaps/01>.

The Army Vision

We want to talk to you today about where we are in achieving the Army Vision. In our testimony, we will describe the magnificent work the Army has done in recent months and identify the challenges we continue to face. There is still much work to be done, but the Army has moved out. It is transforming in comprehensive and profound ways to be the most strategically responsive and dominant land force of the 21st Century—decisive across the entire spectrum of military operations.

To meet the national security requirements of the 21st Century and ensure full spectrum dominance, the Army articulated its Vision to chart a balanced course and shed its Cold War designs. The Vision is about three interdependent components—People, Readiness, and Transformation. The Army is people—soldiers, civilians, veterans, and families—and soldiers remain the centerpiece of our formations. Warfighting readiness is the Army's top priority. The transformation will produce a future force, the Objective Force, founded on innovative doctrine, training, leader development, materiel, organizations, and soldiers. The Vision weaves together these threads—People, Readiness, and Transformation—binding them into what will be the Army of the future.

Achieving The Vision

Last year, the Army took the initial steps to achieve the Vision. One step was the continued realignment of our budget priorities, generating investment capital by canceling or restructuring eight major Army procurement programs. Unfortunately, the Army has had to eliminate or restructure 182 programs over the past decade and a half. It is not that these systems and capabilities were unnecessary; rather, our resource prioritization made the programs unaffordable. Joining with the Defense Advanced Research Projects Agency in a cooperative research and development

effort, we began to streamline our acquisition process to focus and accelerate the development and procurement of enabling technologies for our Objective Force. To reduce the risk from the capability gap between our heavy and light forces, the Army developed a concept and began to organize an interim capability until the 21st Century Objective Force is fielded. The Army also completed a comprehensive study of how it trains soldiers and grows them into leaders, knowing that the capabilities of a transformed Army will reside in competent, confident, adaptive, and creative people.

The People

In our fiscal year 2002 budget, we continue to emphasize people, the core of our institutional strength. Well-being—the physical, material, mental, and spiritual state of soldiers, families, and civilians—is inextricably linked to the Army's capabilities, readiness, and its preparedness to perform any mission.

To improve well-being, we are offering technology-based distance learning opportunities; working to improve pay and retirement compensation; working with the Department of Defense to guarantee that TRICARE meets the needs of our soldiers, retirees, and their families; improving facilities maintenance; and modernizing single soldier and family housing. The much welcomed increases in housing allowance and efforts to reduce out of pocket expenses is an important step toward restoring faith with our soldiers and their families. The health care provisions in the fiscal year 2001 National Defense Authorization Act for our soldiers, retirees, and family members represent the types of significant improvements the Army continues to seek for the force's well-being. Sustained Congressional support for important well-being initiatives helps us recruit and retain a quality force.

Indeed, the pay raise, pay table reform, and retirement reform, as well as diligent efforts by leaders at all levels of the Army helped us exceed our recruiting and retention goals in fiscal year 2000. Attention to the well-being of our people will keep trained and qualified soldiers and civilians in the Army in the years to come.

Manning

In fiscal year 2000, we started a four-year effort to increase personnel readiness levels. The Manning Initiative redistributed soldiers to fill all personnel authorizations in

every active component combat division and cavalry regiment, but by doing so, we accepted some risk in the institutional base. This effort exposed the serious gap that has existed in the aggregate between manning requirements and authorizations. It is possible that we will need to increase personnel authorizations to meet all requirements, dependent upon ongoing reviews of overall Army missions. Meeting the requirements with the active component, however, is not enough. As mission demands necessitate increased use of our reserve components, we must bolster their full-time support requirements to better keep them ready and available. Manning the entire force will reduce operational and personnel tempo and improve both readiness and well-being.

The fiscal year 2002 budget increases for enlistment and retention bonuses will enable the Army to sustain its recent recruiting and retention successes. Funding for change-of-station moves helps to ensure we can place soldiers when and where they are needed to man units at desired grade and skill levels, and further advance the Army's transformation.

Readiness

Readiness is a top priority. It means we must be prepared to execute strategic missions across the full spectrum of operational requirements around the globe. Our military formations must be able to conduct a range of activities from engagement, to stability and support operations, to warfighting. On any given day, the Army has nearly 125,000 soldiers and 15,000 U.S. civilians forward stationed in over 100 countries around the world. Our fiscal year 2002 budget supports our most critical readiness requirements, although we have accepted moderate risk in the level of funding for active component air and ground OPTEMPO [operational tempo] to decrease, and possibly halt, the rate of deterioration of our facilities and augment training enablers.

Measuring the readiness of the Army to respond to the Nation's call requires accuracy, objectivity, and uniformity. Our current standards are a Cold War legacy and reflect neither the complexity of today's strategic and operational environments nor other important factors. Near-term factors encompass the overall capability of units to deploy and include training enablers such as training ranges, institutional support, and depot maintenance; full time support for our reserve components; and installation support. Long-term readiness factors affect the Army's ability to fight in the future and to retain quality personnel. We are re-examining how to measure Army readiness in the near-term, the long-term, and across the range of missions we may be expected to undertake. This new reporting system will provide timely and accurate information on the status of the Army's readiness, with measurements that are relevant and quantifiable, to enhance the ability of commanders to make the best possible employment decisions. It will also give the American people a more accurate assessment of how ready their Army is to do what it is asked to do.

Transformation

The third thread of the Vision requires a comprehensive transformation of the entire Army. This complex, multi-year effort will balance the challenge of transforming the opera-

tional force and institutional base while maintaining a trained and ready force to respond to crises, deter war and, if deterrence fails, fight and win decisively. Transformation is far more extensive than merely modernizing our equipment and formations. It is the transformation of the entire Army from leader development programs to installations to combat formations. All aspects—doctrine, training, leaders, organization, materiel, and soldiers—will be affected.

Transformation of the Army's operational force proceeds on three vectors—the Objective Force, the Interim Force, and the Legacy Force. All are equally necessary to our Nation's continued world leadership. The Objective Force is the force of the future and the focus of the Army's long-term development efforts. It will maximize advances in technology and organizational adaptations to revolutionize land-power capabilities. The Interim Force will fill the current capability gap that exists between today's heavy and light forces. Today's force, the Legacy Force, enables The Army to meet near-term National Military Strategy commitments. Until the Objective Force is fielded, the Legacy Force—augmented or reinforced with an interim capability—will continue to engage and respond to crises to deter aggression, bring peace and stability to troubled regions, and enhance security by developing bonds of mutual respect and understanding with allies, partners, and potential adversaries. It must remain ready to fight and win if necessary, giving us the strategic edge to allow transformation.

The Army's fiscal year 2002 budget supports procurement and upgrade of important Legacy, Interim, and Objective Force systems. It procures 326 Interim Armored Vehicles [IAVs] and five Wolverine systems. It also continues support for the Abrams-Crusader common engine program and both the Abrams and Bradley upgrade programs.

As the Army works to develop and acquire the technologies for the Objective Force, the Legacy and Interim Forces will guarantee Army readiness. Our most pressing concerns this year include the modernization and recapitalization of selected Legacy Force systems.

Legacy Force

Recapitalization and modernization efforts are necessary to ensure current and near-term warfighting readiness. Currently, 75 percent of major combat systems exceed engineered design half-life and will exceed design life by 2010; system operation and sustainment costs are up over 35 percent, and aircraft safety of flight messages are up 200 percent since 1995. We must judiciously modernize key armored and aviation systems in the Legacy Force to enhance force capabilities. We will further digitize the Abrams tank to increase situational awareness and remanufacture early model Bradley infantry fighting vehicles to improve lethality, situational awareness, and sustainability. We will procure new systems like the Crusader howitzer to increase force effectiveness, reduce friendly casualties, ease logistics support requirements, and improve deployability. Crusader will maximize the total capabilities of the Legacy Force. Fielding the Patriot Advanced Capability-3 missile defense upgrade and the Theater High Altitude Area Defense system will significantly increase our in-theater force protection. Current Legacy Forces will benefit from upgrades and enhancements to proven systems. Interim Forces will demonstrate the power of developmental and

off-the-shelf communications and intelligence capabilities. The Army has made the hard decisions for selective modernization to sustain combat overmatch. What is needed is continued support for our prudent investment strategy to keep our force strong and credible.

Concurrently, the Army will selectively recapitalize Legacy Force equipment to combat the rapid aging of our weapons systems. The fiscal year 2002 budget takes a step in this direction by providing additional funding to depot maintenance in preparation for recapitalization.

Interim Force

The fielding of the Interim Force fills the strategic gap between our heavy and light forces and is an essential step toward the Objective Force. The key component of the Interim Force is the Interim Brigade Combat Team (IBCT), the first two of which are being organized at Fort Lewis, WA. On July 12, 2001, we announced the selection of the next four brigades to transform to IBCTs: the 172nd Infantry Brigade (Separate) at Forts Richardson and Wainwright in Alaska; the 2nd Armored Cavalry Regiment (Light) at Fort Polk, LA; the 2nd Brigade, 25th Infantry Division (Light) at Schofield Barracks, HI; and the 56th Brigade of the 28th Infantry Division (Mechanized) of the Pennsylvania Army National Guard. The IBCT's primary combat platform, the Interim Armored Vehicle (IAV), will fulfill an immediate requirement for a vehicle that is deployable any place in the world, arriving ready for combat. The IAV will consist of two variants, a mobile gun system and an infantry carrier with nine configurations. The IAV will achieve interoperability and internetworked capability with other IBCT systems by integrating command, control, communications, computer and intelligence, surveillance, and reconnaissance systems. Congress supported the IBCT concept with an additional \$600 million in the Fiscal Year 2001 Defense Appropriations Act for IAV procurement and for organizing the second IBCT. The Army has programmed resources to field six to eight IBCTs.

The Army will train and test soldiers and leaders in the doctrine and organization of these new units to ensure that they can respond to operational requirements. An IAV-equipped battalion-sized element will undergo training and initial operational testing and evaluation to guarantee system suitability and effectiveness. Innovative applications and technology insertion in supporting forces will complete the IBCT package and enable full operational capabilities for the first IBCT in 2005.

Objective Force

The Army's ultimate goal for transformation is the Objective Force. Operating as part of a joint, combined, and/or interagency team, it will be capable of conducting rapid and decisive offensive, defensive, and stability and support operations, and be able to transition among any of these missions without a loss of momentum. It will be lethal and survivable for warfighting and force protection; responsive and deployable for rapid mission tailoring and for the projection required for crisis response; versatile and agile for success across the full spectrum of operations; and sustainable for extended regional engagement and sustained land combat. It will leverage joint and interagency

reach-back capabilities for intelligence, logistical support, and information operations while protecting itself against information attacks. It will leverage space assets for communications; position, navigation, and timing; weather, terrain, and environmental monitoring; missile warning; and intelligence, surveillance, and reconnaissance. The Objective Force will provide for conventional overmatch and a greater degree of strategic responsiveness, mission versatility, and operational and tactical agility. With the Objective Force, the Army intends to deploy a combat-capable brigade anywhere in the world in 96 hours, a division in 120 hours, and five divisions in 30 days. Our ability to quickly put a brigade-size force on the ground, with the balance of a division following a day later, fills a current gap for credible, rapid deterrence. The Objective Force will offer real strategic options in a crisis and change the strategic calculations of our potential adversaries. The Army with Objective Force capability will provide the National Command Authorities with a full range of strategic options for regional engagement, crisis response, and land force operations in support of the Nation.

Science And Technology

Advances in science and technology will lead to significantly improved capabilities for the Objective Force. The Army is programming over \$8 billion for science and technology efforts to begin fielding the Objective Force by the end of the current decade. This effort seeks to resolve a number of challenges: how to balance sustained lethality and survivability against ease of deployability; how to reduce strategic lift requirements and logistical footprint required in-theater; how to mitigate risk to our support forces and to forces in-theater; and how to ensure digitized, secure communications to provide battlefield awareness at all levels of command. The Army will find the best possible answers while maintaining the ready, disciplined, and robust forces our Nation demands, our allies expect, and our adversaries fear.

Future Combat Systems (FCS), a system of systems, is one of the essential components for the Army's Objective Force. To accelerate development of key technologies, the Army partnered with the Defense Advanced Research Projects Agency in a collaborative effort for the design, development, and testing of FCS while simultaneously redesigning the force. The fiscal year 2002 budget funds FCS demonstrations of system-of-systems functions and cost sharing technologies. Forces equipped with FCS will network fires and maneuver in direct combat; deliver direct and indirect fires; perform intelligence, surveillance, and reconnaissance functions; and transport soldiers and materiel. Over the next six years, the Army will demonstrate and validate FCS functions and exploit high-payoff core technologies, including composite armor, active protection systems, multi-role (direct and indirect fire) cannons, compact kinetic energy missiles, hybrid electric propulsion, human engineering, and advanced electro-optic and infrared sensors.

Institutional Transformation

The Army's fiscal year 2002 budget funds schoolhouse training at 100 percent. This is a first. It funds U.S. Army Training and Doctrine Command (TRADOC) transformation

initiatives to include expansion of One Station Unit Training, establishment of a land warfare university, basic officer leadership course enhancements, establishment of an accession command, and quality assurance initiatives.

As the combat formations are being transformed, the Army's institutional base—schools, services, facilities, and installations—must also change to support both the Objective Force and current mission requirements. TRADOC produces tactically and technically proficient soldiers and leaders and the doctrine and concepts for operational success. The Army must train soldiers—in simulations, on ranges, and in exercises—and grow them into leaders who are capable of executing rapid and seamless transitions between missions throughout the spectrum of operations. Training must continuously improve and respond to emerging technologies. We must recapitalize and modernize ranges, distance learning centers, Army schools, and combat training centers to keep pace with changes in force structure, technology, and the global environment.

Training And Leader Development

Key to transformation is the training and leader development necessary for producing adaptive soldiers and leaders who can lead and succeed in both joint and combined environments while capitalizing on the latest battlefield technologies. The Army Training and Leader Development Panel (ATLDP) has concluded its in-depth study of issues affecting the Army's culture and its training and leader development doctrine. The ATLDP surveyed and interviewed over 13,500 officers and spouses. Follow-on studies of the noncommissioned officer and warrant officer corps will be conducted over the next six months. The primary objectives of the panel were to identify skill sets required of Objective Force leaders and to assess the ability of current training and leader development systems to cultivate those skills. Study participants addressed issues that included well-being, job satisfaction, training standards, and the officer education system. This study represents a candid self-assessment by the Army; it seeks to restore faith with soldiers and set a course for improving all aspects of the Army's culture by bringing institutional beliefs and practices in line. To that end, some steps have already been taken, including adapting the officer education system to meet the needs of the transforming Army; eliminating non-mission compliance tasks that interfere with warfighting training; allocating full resources to our Combat Training Centers; and protecting weekends for the well-being of soldiers and their families. It is a testament to the strength of any organization when it is willing to take such a candid look at itself, and this kind of healthy introspection characterizes a true profession.

The fiscal year 2002 budget funds development of training, training products, and materials that support resident and unit training programs. It provides for the analysis, design, development, management, and standardization of processes and practices; integration and operations of Army training information systems; and automation of the training development process. In the area of leader development, it allows schoolhouse trainers to adapt training programs for future leaders and increases training support funding for aviation and specialized skill training. Further, the budget funds active component unit training OPTEMPO

and supports critical training enablers. Our Combat Training Center program remains the proving ground for warfighting proficiency, and we currently have scheduled ten brigade rotations through the National Training Center, ten brigade rotations through the Joint Readiness Training Center, and five brigade rotations through the Combat Maneuver Training Center.

Logistical Transformation

We will transform logistical services and facilities to enhance readiness and strategic responsiveness. Today, logistics comprises approximately 80 percent of the Army's strategic lift requirement, creating a daunting challenge to deployability. Prepositioning stocks and forward presence solves only part of the problem. Currently, the Army has seven brigade sets of equipment forward deployed on land and at sea with an eighth brigade set being deployed in fiscal year 2002. As we fundamentally reshape the way the Army is deployed and sustained, we will ensure logistics transformation is synchronized with the needs of the operational forces and supports Department of Defense and Joint logistics transformation goals. The Army is examining how to reduce the logistical footprint in the theater of operations and to reduce logistical costs without hindering warfighting capability and readiness. Approaches already being explored are recapitalization, common vehicle chassis design, a national maintenance program, and an intermediate basing strategy for force protection. We are synchronizing the critical systems of the institutional Army with our operating forces to ensure the transformation of the Army is holistic and complete.

Conclusion

The Army has embarked on a historic enterprise. Recognizing that the forces we can provide to the combatant commands are becoming obsolescent in a changing strategic environment, the Army is transforming. With the support of the Administration and Congress, the Army has charted a course that will better align its capabilities with the international security environment, enhancing responsiveness and deterrence while sustaining dominance at every point on the spectrum of operations. The Army transformation is the most comprehensive program of change in a century and is already underway. It comes at a propitious moment. We live in a time of relative peace. Our Nation's economic strength has given us a period of prosperity. A decade of post-Cold War experience has provided us strategic perspective, and American technological power gives us tremendous potential. We have seized this opportunity to guarantee our strategic capability and our non-negotiable contract with the American people well into this century.

Mr. Chairman and distinguished members of the Committee, we thank you once again for this opportunity to report to you today on the state of your Army. The programs, schedules, and funding levels described in this statement, however, may change as a result of Secretary Rumsfeld's strategy review, which will guide future decisions on military spending. With the continued support of the Administration and Congress, the Army will have the resources to remain Persuasive in Peace, Invincible in War. We look forward to discussing these issues with you.

IMPROVING DIGITAL TERRAIN WITH ARTIFICIAL INTELLIGENCE

MAJ James J. Donlon and Dr. Kenneth D. Forbus

Introduction

Any military professional will attest that understanding terrain is fundamental to planning and conducting operations. Our reliance on maps and other representations of terrain is evident in military products and processes at the tactical, operational, and strategic levels of planning. Today, the relatively widespread availability of digital terrain data (DTD) has enabled high-tech adaptations of map and imagery data for uses such as simulation, command and control (C2), and reconnaissance. However, we have yet to harness the full potential of this resource.

To support many planning tasks, we need to go beyond mapping and visualization to produce task-specific interpretations of terrain data. Geographic information systems (GISs) provide an excellent foundation for producing such visualizations, but these are not sufficient to produce the kinds of terrain analysis needed by military analysts and commanders. We recently demonstrated that artificial intelligence (AI) can help bridge this gap by automatically producing military interpretations of terrain data for trafficability analysis. We believe that the qualitative spatial reasoning techniques used in that application can be extended to address a wide range of military terrain analysis tasks and benefit current and emerging applications such as C2 tools and simulations.

The Problem

Military planners have long understood the need for special-purpose interpretations of map data. Let's consider the overlays produced to describe the environment for the intelligence preparation of the battlefield (IPB). To make effective military use of a traditional map, military intelligence analysts produce overlays depicting mili-

tary terrain trafficability, potential engagement areas, and key terrain, just to name a few.

For complex tasks such as military planning and operations, these overlays help identify and communicate what is critically important about that terrain (e.g., trafficability for military vehicles) while ignoring unnecessary details. These simplifications enable us to optimize use of maps by describing the environment according to useful distinctions.

Today, many military tasks have been automated and even transformed by modern technology. Digital terrain data have made it possible to conduct computer-based military planning and operations using the digital equivalent of maps. Currently, however, we have not yet realized the digital equivalent of the high-level interpretations of the digital maps—the equivalent of the doctrinal overlays produced in IPB. GIS software allows for storing and manipulating terrain data in general ways, but cannot perform military terrain analysis. As a result, current C2 tools cannot demonstrate the sophisticated understanding of terrain needed by military planners the way an intelligence analyst does using an overlay.

Qualitative Reasoning

There is a wide range of C2 applications, simulation environments, and planning tools being developed and fielded that use digital terrain data for computer-based map displays. All of these applications support some form of reasoning about the impact of that terrain on military operations. Typical determinations include path planning, rates of movement, visibility and fields of fire, and site selection. The common approach is to access the feature coding of GIS primitives (i.e., polygons, arcs, or rasters) in the DTD through a GIS and use the GIS-provided facilities

to support the desired determinations. This is a sensible place to start because these systems provide powerful and useful facilities for digital mapping, perform complex transformations of this data, and solve common geospatial problems. However, these GIS computations are quantitative, relying on visualization tools and extensive user interactions to provide the qualitative insights needed in military applications. In contrast, most human reasoning about geographic space appears to reflect a qualitative interpretation of that space.

While valuable contributions will come from many areas of AI, we believe that qualitative reasoning in particular has much to offer. Qualitative representations can depict terrain data that are encoded as many continuous properties into discrete, conceptually meaningful units.

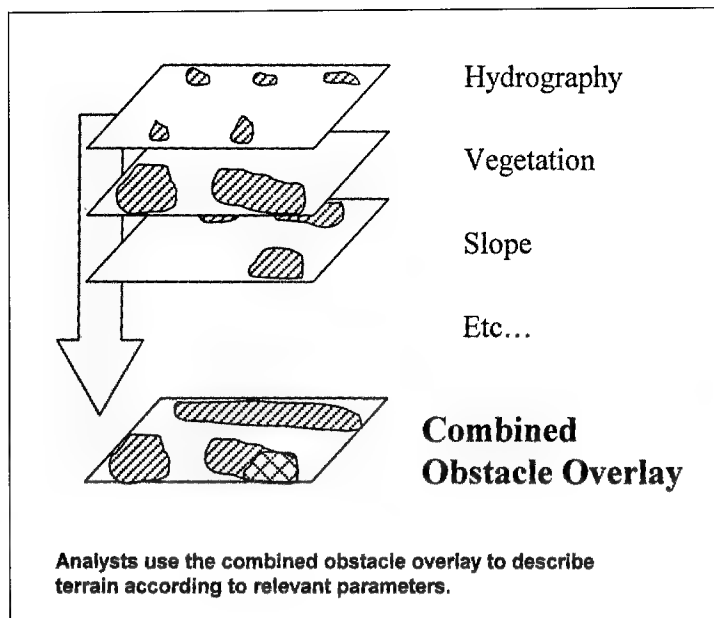
Qualitative spatial representations carve space into regions based on a combination of physical constraints and task-specific constraints. Relative to military trafficability, for example, identifying unrestricted versus restricted areas is useful because of the different effects that such terrain has on the movements of various military units.

Generally, it rarely matters why such areas are restricted or severely restricted. Indeed, such areas may be so designated because they represent an aggregation of smaller areas where trafficability factors result from various terrain features such as vegetation, slope, hydrography, and surface roughness. This corresponds to what a human analyst does when he or she produces a combined obstacle overlay (figure on Page 33).

These qualitative spatial representations describe space according to parameters directly relevant to the required task. These representations often need to be firmly rooted in a quantitative, diagrammatic representation for a variety of technical reasons. Digital terrain data provide this diagrammatic description in a way that is convenient for reasoning systems to access and manipulate. We use this quantitative information (e.g., feature coding of terrain features or specific coordinates of a unit) in qualitative spatial reasoning. For instance, using qualitative spatial descriptions for trafficability helps determine routes in a

general way and helps calculate time-distance estimates about travel over those routes (e.g., can they get there in time?).

Using qualitative descriptions also allows computers to perform more human-like reasoning and explanations. In other words, by identifying and using these conceptually meaningful units, computers can become intelligent and articulate, describing, for example, how restricted and severely restricted areas of terrain contribute to the identification of avenues of approach, or potential battle positions.



Proof Of Concept

In studies at Northwestern University, we applied these techniques to trafficability analysis problems as part of the High Performance Knowledge Bases Program. This research, supported by the Defense Advanced Research Projects Agency, shows how GISs can be used to support qualitative spatial reasoning. We automatically generated combined obstacle overlays (COOs) and complex factor overlays (CFOs) to answer terrain analysis and trafficability questions related to planning and conducting military operations. The GIS data represented the terrain in the Straits of Hormuz region. The GIS coding of this terrain data described vegetation, hydrology, slope, and road networks. This array of coverages and the terrain in the area provided an opportunity to test these techniques, and the results are promising.

The CFOs and COOs were used by military personnel to judge correctness and plausibility of trafficability results consistent with U.S. Army practice. In all tested areas, correct CFOs and COOs were created, and trafficability questions (e.g., maximum speed in particular regions) produced correct answers.

Generating CFOs and COOs presented the opportunity to produce qualitative spatial descriptions that correspond to authentic descriptions produced by military analysts. It also allowed modeling of the well-established terrain analysis practices that use those

descriptions. A variety of trafficability and path-finding queries, producing authentic results and compelling explanations grounded in qualitative reasoning, were also supported. This demonstrated that qualitative reasoning enables computer systems to produce relevant, high-level descriptions of terrain that support automated reasoning and correspond closely to human understanding of terrain.

Application

Automating the production of COOs and CFOs suggests that many such intelligence tasks that are still done manually can be similarly produced. While military planners currently spend hours or days producing a variety of overlays and estimates for an area of operations, this technique could allow the same descriptions to be produced immediately, on demand. Qualitative descriptions can also provide richer representations of the environment to support higher-fidelity planning and simulations.

Consider a classic military strategy problem in simulation: massed fires. If you assign three units to attack a localized enemy, simulated units will choose paths to get to that enemy and then attack it. Such simulations are susceptible to the problem of naive pathfinding. Suppose the quickest path to the enemy involves a tightly constrained mobility corridor, forcing your units to travel it one at a time (units in column). The enemy, who would have been overwhelmed had your forces

converged all at once, can then destroy each of them in turn as they enter the clearing.

Good military planners solve this problem differently. They specify paths that the units will take and specify synchronization constraints (i.e., "using these axes of advance, attack at 0400"). Good communication is essential to good force coordination.

Understanding the impact of terrain on unit movements (provided by overlays in current military planning) is essential in expediting these determinations and enabling efficient communication. We

believe computers can use this type of qualitative reasoning to achieve the same effectiveness in communicating between tools and humans, as well as between automated reasoning processes. Providing this type of interaction between a human planner and our map-based tools could provide better support to planning, simulation, and C2.

Conclusion

As computer-based planning, simulation, and C2 mature, sophisticated and natural representations of space will be necessary to make optimum use of terrain descriptions. The research presented in this article represents a promising first step toward the sort of intelligent applications that could be part of future command-post software.

MAJ JAMES J. DONLON is the Director of the Knowledge Engineering Group at the U.S. Army War College. He received a B.S. degree from the University of Delaware and an M.S. degree from Northwestern University, and he is pursuing a Ph.D. in computer science at George Mason University.

DR. KENNETH D. FORBUS is a Professor of Computer Science and Education at Northwestern University. He received his Ph.D. from the Massachusetts Institute of Technology.

INTELLIGENT AGENTS: TOOLS FOR THE COMMAND POST AND COMMANDER

LTC Michael Bowman, Dr. Gheorghe Tecuci, and Mihai Boicu

Introduction

You are a brigade commander, 72 hours into the fight, and running on caffeine and catnaps. Your operations officer is briefing you on possible courses of action (COAs) for a new mission. He recommends a COA and explains the advantages. Something about the COA bothers you, but you just can't put your finger on it. Fatigue, stress, or some other distraction is keeping you from recalling something that would make a difference in this decision. You make your best judgement and drive on, but your gut feeling leaves you thinking that there was a better way—if you had just had more time or a clearer head!

Our decisions are a function of our education, training, experience, and personal preference. There is ample evidence that the decisions we make under stress are generally not as good as those we make when we are well rested, comfortable, and relaxed. Thus, the U.S. military selects commanders based on their demonstrated ability to make good decisions under adverse conditions.

Revisit the opening scenario. The situation and the environment are the same, but this time you have another tool to assist you. An intelligent agent, trained by you to remember the lessons of a lifetime, will help you decide. The intelligent agent is software that runs on common computers and accesses data from your battle command systems and planning tools, regardless of whether they are powerful networked computer systems or handwritten notes and sketches.

The intelligent agent does not care how cold it is or how much sleep you have had. In seconds, it evaluates the COAs and presents you with a list of strengths, weaknesses, and issues for each of them. You quickly scan the list, discarding some and nodding agree-

ment with others, until you come to the one or more gems that you recognize as being critical to the decision. Based on your own judgement and the recommendations of your staff, but now armed with a few additional key considerations, you make your decision.

These considerations might be based on planning guidelines you learned in a classroom, an after action review from an exercise you participated in, or on new enemy tactics. The intelligent agent combines the things a computer does best—sorting and sifting through data—with the things a human does best—learning from a lifetime of experience. It provides concise, relevant, and explainable considerations that commanders can take into account when making decisions. This is our vision for the use of intelligent agents in the command post of the near future!

Learning Agents Laboratory

Decision support and expert systems have been around for a while. To date, they have produced more hype than service, and they have played a very limited role in military systems. Even with today's rapid growth in computing power, most software products claiming to be intelligent don't solve complex, real-world problems.

The George Mason University (GMU) Learning Agents Laboratory (LALAB) is taking a novel approach to the creation and use of intelligent agents to solve complex problems. The goal of GMU's research is to develop methods and tools that allow users with minimal computer skills to easily build, teach, and maintain intelligent software agents.

GMU's initial research was part of the Defense Advanced Research Projects Agency (DARPA) High Performance Knowledge Base (HPKB) project. Addi-

tional support was provided by the U.S. Air Force Office of Scientific Research and the Army Battle Command Battle Laboratory. The work continues in the DARPA Rapid Knowledge Formation Project, still supported by the Air Force and now also supported by the Army War College. The goal of HPKB was to test the claim that with the latest artificial intelligence (AI) technology, large knowledge bases could be quickly built and updated. GMU-DARPA research indicates that with the right approach, intelligent agents can meet this goal.

Acquiring Knowledge

A major stumbling block in building intelligent systems that solve problems equal to a human subject matter expert (SME) is the "knowledge acquisition bottleneck." This bottleneck comes from the requirement to transfer knowledge from an expert, through a knowledge engineer, to the computer. The knowledge engineer must learn what the expert knows and how the expert uses that knowledge. The engineer then uses various tools and techniques to build a knowledge base. This is a long, painful, and inefficient process.

The GMU approach, called "Disciple," is a theory, methodology, and tool set in which an SME directly constructs an intelligent agent. In this approach, SMEs teach the agent to perform various tasks in a way that resembles how they would teach an apprentice or student. They give the agent examples and explanations, and supervise and correct its behavior.

The traditional approach to create a useful knowledge base requires very complex steps, including the creation of an ontology that defines relevant terms and relationships from a problem domain, the definition of problem-solving rules, and the validation and update of

these rules. In general, these tasks require the creation of formal computer representations, a task that only a knowledge engineer can accomplish.

In the Disciple approach, complex tasks are replaced with simpler ones. Instead of creating an ontology, the expert updates and extends an initial ontology imported from existing sources of knowledge. Further, instead of defining a complex problem-solving rule, the expert identifies and explains an example solution from which Disciple learns a general rule. In lieu of debugging a complex problem-solving rule, the expert critiques specific examples of agent problem solving from which Disciple updates corresponding rules.

The expert will not need to create formal computer representations, just understand information generated by Disciple. Finally, the expert will not need to provide formal explanations, just informal hints that will guide Disciple in generating possible explanations from which the expert will choose.

Disciple's history, capabilities, and inner workings are described in detail in Dr. Gheorghe Tecuci's *Building Intelligent Agents: An Apprenticeship Multi-strategy Learning Theory, Methodology, Tool and Case Studies*, Academic Press, 1998. Recent papers describing improved capabilities are also available on the GMU LALAB Web page at <http://lalab.gmu.edu>.

A Sample Application

As part of HPKB, the GMU LALAB developed a Disciple agent to critique COAs for ground-combat operations. The COAs were provided by the Army and came in a standard format consisting of a multiparagraph description and a tactical sketch.

The Disciple COA agent identifies strengths and weaknesses of a COA with respect to the principles of war and the tenets of Army operations as described in Army Field Manual 100-5. A general understanding of the principles and tenets exists, but military experts disagree on their application. The GMU LALAB's goal was to create a tool that contained this common understanding while being flexible enough to allow rapid personalization by the SME training and using the agent. The following is an example of a strength identified by Disciple in a COA for the principle of surprise:

"There is a strength with respect to surprise in COA411 because the enemy is unlikely to be prepared for the heavy concentration of combat power applied by the Blue-force main-effort during its penetration. In this action, the main-effort is applying a force ratio of 10.6, which is more than double the recommended force ratio of 3.0. Applying this much combat power for this penetration is likely to surprise the enemy and is indicative of the proper application of the principle of surprise."

Building Disciple Agents

The development of a specific Disciple agent includes two main processes: ontology development and agent training. Building the domain ontology begins with importing background military knowledge such as unit echelons and capabilities from existing sources of knowledge. Additional terms and relationships identified by the expert are added as necessary. The Disciple-COA ontology was built by importing many terms needed to model the COA domain from a research knowledge base developed by Cycorp, called CYC.

Training a Disciple agent is an iterative process of showing it how to solve problems based on examples, letting the agent attempt to solve other problems, and providing the agent explanations for why these solutions are right or wrong. A strength of this approach is that the expert does not have to be perfect or comprehensive when conducting agent training. Flaws in training show up naturally when Disciple tries to solve problems on its own. The expert merely has to examine Disciple's solutions and provide explanations regarding where it went wrong.

Experimental Results

The Disciple methodology and agents have been tested with other systems as part of DARPA annual HPKB Program evaluations. In summary, the experimental results show that Disciple-based agents were highly effective in knowledge acquisition and complex problem solving, outperforming other systems developed to solve similar problems.

In August 1999, the GMU LALAB conducted a knowledge-acquisition experiment to demonstrate that it is possible for military experts to directly

train Disciple agents. Four Army officers successfully trained Disciple agents that critiqued COAs. Commenting on the usefulness of Disciple, LTC John N. Duquette stated, "The potential use of this tool by domain experts is only limited by their imagination—not their AI programming skills." We believe this is the first time SMEs with no prior knowledge or engineering experience successfully trained intelligent agents to solve complex problems.

Conclusion

This article briefly presented a vision for using intelligent agents in a military command post, described some of the challenges, and presented the Disciple approach to overcoming those challenges. The long-term goal of the GMU LALAB is to develop technology that allows typical computer users to directly build intelligent agents and knowledge bases as easily as they use personal computers for text processing. This will change the way intelligent agents are built, from being programmed by a knowledge engineer to being taught by an SME, and will contribute to a generalized application of agent technology in all areas of human activity.

LTC MICHAEL BOWMAN was a student at the Army War College and a Ph.D. candidate at GMU at the time he wrote this article. He received a B.S. degree from Ouachita Baptist University and an M.S. degree from the Naval Postgraduate School.

DR. GHEORGHE TECUCI is Professor of Computer Science, Director of the GMU LALAB, and a member of the Romanian Academy. He received M.S. and Ph.D. degrees in computer science from the Polytechnic University of Bucharest and another Ph.D. degree in computer science from the University of Paris-South. He has published more than 100 scientific papers and 5 books, most of them in artificial intelligence.

MIHAI BOICU was a Ph.D. student in computer science at GMU and a Graduate Research Assistant in the GMU LALAB at the time he wrote this article. He has published more than 15 papers and is a member of the American Association for Artificial Intelligence.

THE DEVELOPMENTAL FIRING RANGE AT WALLOPS ISLAND

COL Andrew G. Ellis and Ronald L. Frailer Jr.

Introduction

SGT John Scaglione saw the action firsthand. "I looked up and [the enemy] was about 3,700 meters away and there's BMPs [Russian infantry fighting vehicles] and T-72s sitting on the ridge. The whole brigade on line, within 3 seconds, had let loose with their first rounds. Moving about 20, 25 miles an hour, it's like a cavalry charge toward the Iraqi emplacements. And all you could see, every time we shot, was a massive explosion. The turrets were flipping 40, 50 feet in the air." (From *Frontline*, episode 1407T, broadcast date Jan. 28, 1997.)

During the battle of Medina Ridge, the 1st Armored Division defeated Iraqi forces in less than an hour. Hundreds of Iraqi tanks and armored vehicles were destroyed with only a single American casualty. U.S. Armed Forces were able to engage the enemy at ranges in excess of

2 miles, well beyond the range of the Soviet-made Iraqi tanks.

The advantage of engaging the enemy outside his effective range was never better demonstrated than during the Gulf War. Today's ammunition community continues to leverage technological advances that extend the lethality of U.S. ground and naval forces to distances greater than thought possible. Future ammunition and armament technologies will continue to expand that engagement arena on several fronts.

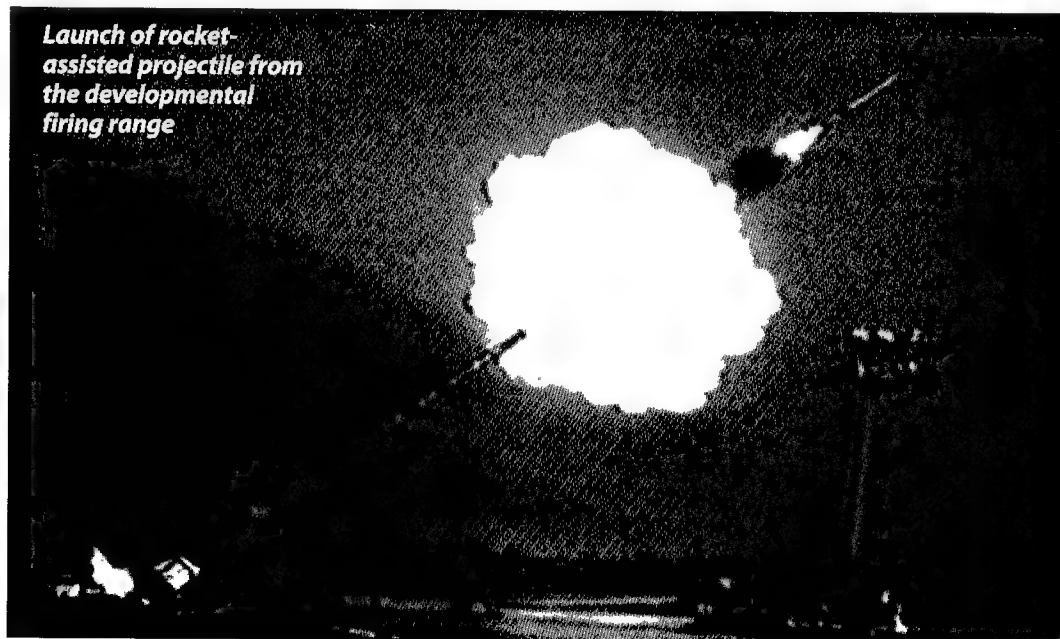
The pursuit of greater lethality at extended ranges is a DOD priority. The U.S. Army is developing a new ammunition suite for the Future Combat Systems that will rapidly engage a full spectrum of anticipated targets such as tanks, self-propelled and towed artillery, infantry fighting vehicles, and helicopters out to 50 kilometers. Currently

under development, the Tank Extended Range Munition will provide extended lethality against non-line-of-sight targets out to 10 kilometers for traditional direct-fire systems like the Abrams Tank.

Similarly, the Navy's Office of Naval Research is developing new ammunition capabilities that will extend naval gun lethality beyond 100 nautical miles. This will provide land-based forces with much-needed naval surface fire support (NSFS) that was lost when battleships were decommissioned. Extended range NSFS is essential not only to support ground forces as they gain a critical foothold on beachheads, but also to provide sufficient standoff distance for future fleet safety. Current items in development or under consideration include the Extended Range Guided Munition, the Barrage Round, the Guided Best Buy Projectile, and the Affordable Near-term Support Round.

Test Capability

Test site location is a major challenge in managing long-range ammunition acquisition programs. Program managers responsible for long-range weapon programs must adequately verify ammunition performance and evaluate effectiveness. The Army Test and Evaluation Command (ATEC), comprising 37 percent of the Army's real estate, is one of the largest, most comprehensive, and diverse DOD providers of test services and facilities for conducting these experiments. Ranges at Dugway Proving Ground, Yuma Proving Ground, and White Sands Missile Range provide



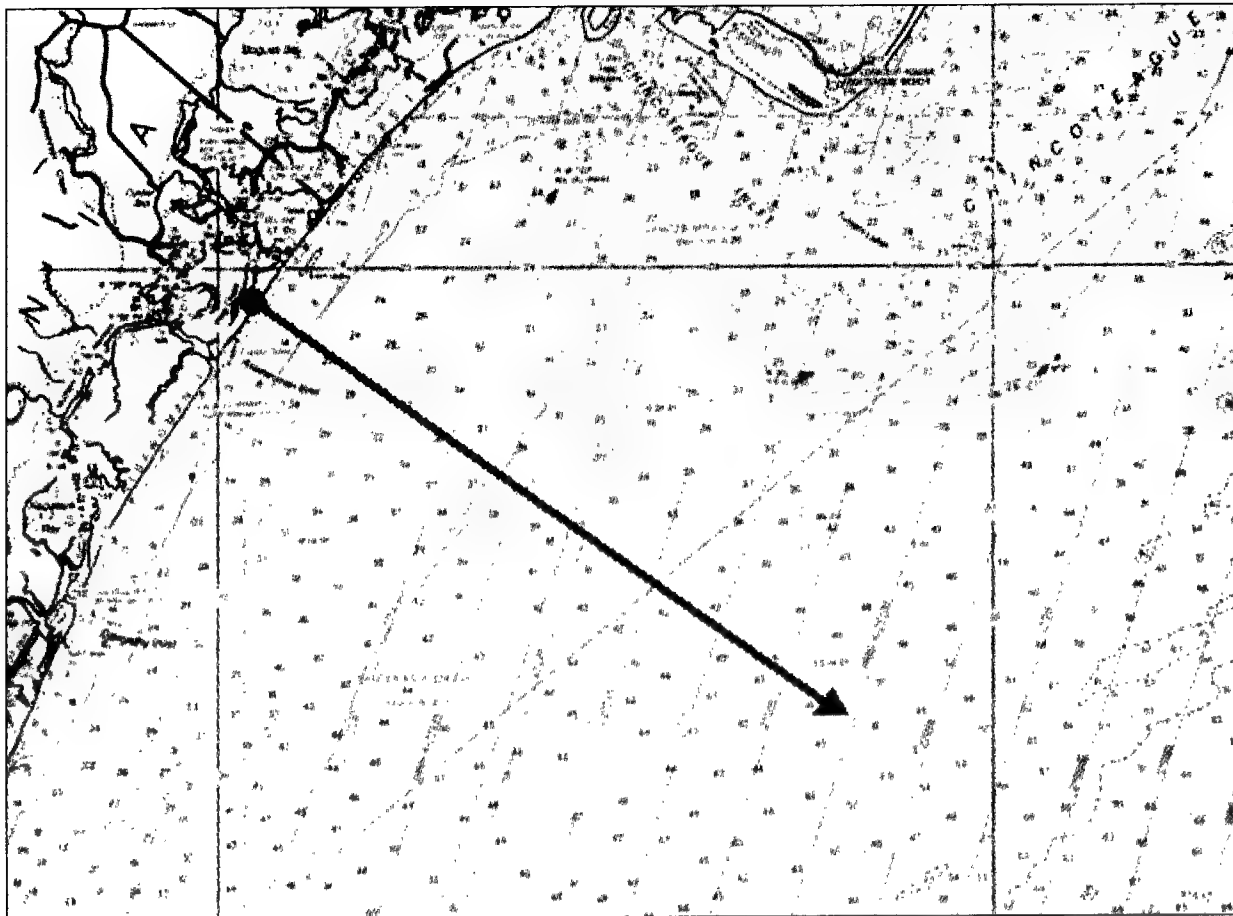


Figure 1.

The developmental firing range is located on Virginia's Wallops Island adjacent to the Atlantic Ocean. This map highlights the downrange area and depicts the typical firing azimuth.

extended-range, indirect-fire test services and now, through a unique partnership, the U.S. Army Aberdeen Test Center (ATC), Aberdeen Proving Ground, MD, has recently expanded its long-range, indirect-fire test capability with the developmental firing range at Wallops Island.

The NASA Wallops Flight Facility (WFF) at Wallops Island, VA, is located only 180 miles southeast of ATC. WFF serves NASA as a national resource for providing low-cost integration, launch, and operation of suborbital and small orbital payloads. Partnership arrangements with Wallops' Navy tenants and other major users, including the Army, promote Wallops' test facility resources.

WFF provides ATC with a designated test site and access to indigenous expertise and instrumentation including C-band tracking radars, telemetry data acquisition, meteorological data collection, and surveillance radars. The test site offers a practically unlimited firing range and a wide safety footprint as shown in Figure 1. The relatively

shallow water that extends outwards of 50 nautical miles permits recovery operations using current techniques. Combined with the technical expertise of ATC, the ammunition community has a unique East Coast capability that expands ATC's long-range testing capability.

Several organizations have been brought together to provide customers the desired test services, making this truly a joint-use facility. Partners and participants include the Army Research Laboratory (ARL); ATC; the Naval Air Warfare Center-Aircraft Division (NAWC-AD); the Navy Explosive Ordnance Disposal (EOD); the Naval Surface Warfare Center-Dahlgren Division (NSWC-DD); Naval Undersea Warfare Center (NUWC); the Space and Naval Warfare Systems Command (SPAWAR) Systems Center, San Diego, CA; and the WFF.

ARL and ATC, collocated at Aberdeen Proving Ground, MD, have teamed to provide technical test services and resources and data collection at the

Wallops Island test site. These include high-speed digital and film photography, telemetry units and receivers, internal ballistic pressure measurements, Weibel tracking radars, and ammunition and gun services. ATC serves as a point of contact and overall coordinator for test services at WFF.

NAWC-AD conducts its own test and training exercises at WFF for its Navy customers. NAWC-AD also supports the developmental firing range with services including contract aircraft services and boat and dive assets for recovery operations. Recovery of test hardware is possible and may provide developers with a valuable post-test analysis capability. Traditional recovery methods have already been demonstrated on larger ammunition items such as 155mm Army and 5-inch Navy projectiles.

The Mk5 Recovery Team out of the SPAWAR Systems Center provides an additional source for recovery operations at WFF. The team is part of the marine mammal program and consists

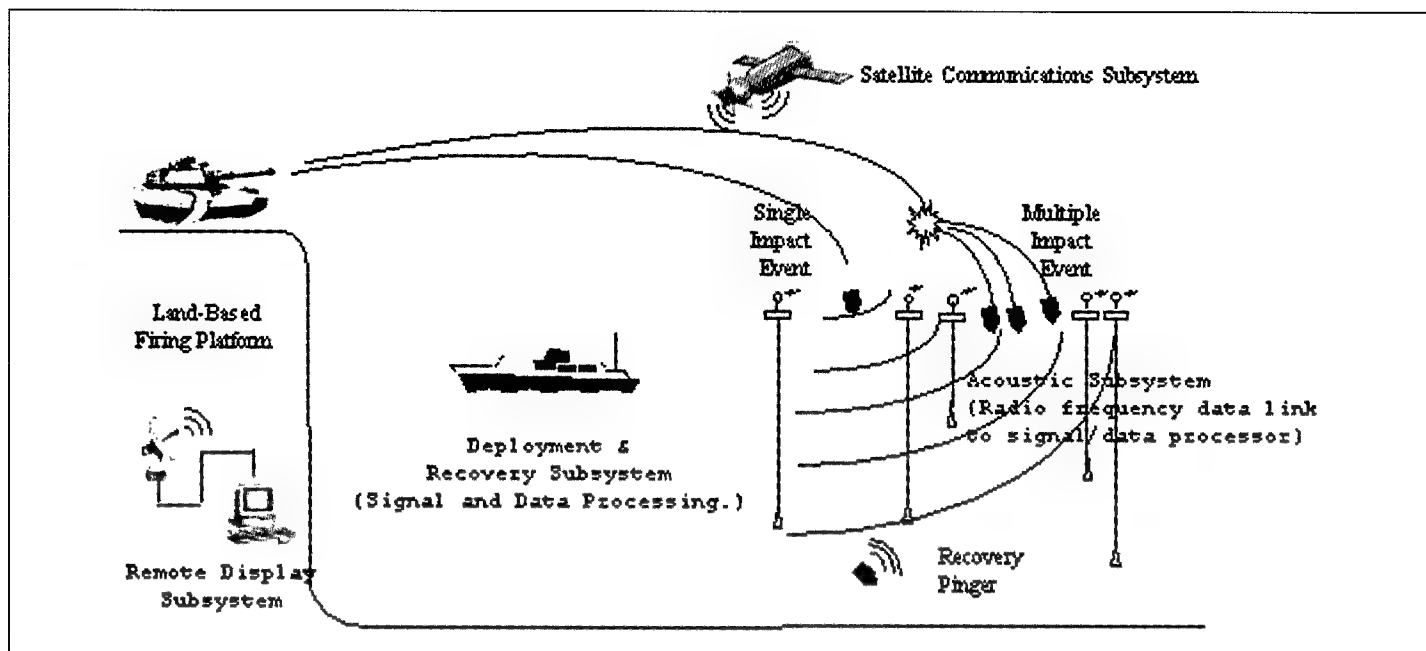


Figure 2.
SILC conceptual drawing

of Navy handlers and trained California sea lions. The diving ability of these trained mammals expands the dive time available for recovery operations and also extends the range available for recovery. Prior to deployment, the animals are trained to recognize specific projectile shapes and attach lifting devices tailored to the test items.

NSWC-DD has vast naval gun expertise and has provided test hardware and coordination with Navy EOD for additional dive and recovery capability. Technical guidance on naval ordinance and program management has also been provided for Navy ammunition development programs.

Future Initiatives

Navy program managers, in conjunction with ARL and ATC, are exploring additional capabilities for the test site. The Navy's Surface Combat Systems Center Facility at WFF, already used to train officers and enlisted personnel in operating the AEGIS Combat System, has additional resources in place including surveillance radar and communication equipment that could have testing applications.

Future test instrumentation is also being developed. A shallow water acoustic scoring system is being developed under the NUWC' Soft Impact Location Capability (SILC) Central Test and Evaluation Investment Program.

The conceptual design is depicted in Figure 2. This would allow impact scoring of projectiles and enhance our ability to locate test items for recovery in the Atlantic Ocean. This capability is anticipated to be online in FY05.

Conclusion

The developmental firing range at Wallops Island adds additional testing options for ammunition program managers. In concert with current ATEC capability, the facility enables the Army to address the full spectrum of test requirements. Specifically, this range offers unlimited flight trajectories, in both vertical and horizontal components, for long-range ammunition. Equally as significant, the firing range provides a wide safety footprint for developmental items.

This effort highlights the advantages of partnering and creative problem solving to address current and future testing issues of significant concern to the Army and DOD. The result is a state-of-the-art testing facility that relies on the shared expertise of the Army, Navy, and NASA to accomplish the ammunition acquisition test and evaluation mission.

WFF provides our researchers and developers with a unique capability to test and evaluate ammunition at extended ranges. This capability is critical to our Armed Forces and enables them

to continue to win on tomorrow's battlefield with minimal casualties.

COL ANDREW G. ELLIS was the Commander of the Aberdeen Test Center when he wrote this article. He has since retired from Active military Service. He has a B.S. in engineering from the U.S. Military Academy and an M.B.A. from the Florida Institute of Technology. He is also a graduate of the U.S. Army Command and General Staff College and the Army War College.

RONALD L. FRAILER JR. is a Test Project Engineer at the Aberdeen Test Center. He holds a B.S. in aerospace engineering from the University of Maryland at College Park and an M.S. in administration from Central Michigan University. Frailer is an Army Acquisition Corps' Corps Eligible member and is Level III certified in test and evaluation engineering.

Introduction

The Guided Multiple Launch Rocket System (GMLRS) engineering phase was among the first engineering efforts to include an integrated product team (IPT) process. But despite the fact that this process led to many design decisions that provided a better product for the money, it fell far short of expectations and its potential. The resulting problems—communication, cooperation, and coordination (the three C's)—could easily be blamed on bad management decisions. However, we would then be overlooking basic issues that were the impetus for management's philosophy, which ultimately resulted in the shortcomings of this IPT process.

There were two basic issues that made this IPT process less effective than it could have been. First, the contractual arrangement did not fully incorporate the IPT process, and second, funding was insufficient to fully implement the process. This article addresses these issues and how they contributed to the problem areas mentioned earlier.

The Three C's

Before we discuss the contracting and funding issues, let's briefly look at the three primary problem areas. The first thing that should be noted is that all three of these areas concern the "integrated" and the "team" part of IPT. Each area is distinct, yet highly correlated. It is also important to note that the IPT process requires that contractor and government personnel act together as an integrated team.

Communication in an open and intimate manner is required for an integrated team, but this is very difficult when members of the team are separated by hundreds of miles. Because travel costs make it economically infeasible to meet face-to-face on a regular basis, there is a need for

long-distance communication. Phone conversations are part of this, but are not sufficient for the level of required communication. As such, communications can be greatly enhanced with the use of video teleconferencing (VTC). However, there were not enough VTC facilities available to the GMLRS IPT, and the facilities that were available were inadequately equipped for communicating technical data.

Cooperation is directly related to communication, but is virtually worthless if IPT members do not openly discuss issues and facts in a cooperative manner. One such problem of the GMLRS IPT was that the contractor did not want to get into a money-losing situation. Therefore, senior contractor managers would not empower their people to make decisions or to openly discuss facts at lower IPT levels. This lack of cooperation was a direct result of the contractor management philosophy, which is discussed later.

Coordination is the final requirement for a team, and one of the benefits of the IPT process is that team members with various levels of expertise work together to not only get the best overall design, but also to make the best use of personnel. The contractor seemed unwilling to accept government data, analyses, or

recommendations, which resulted in many shortfalls because the government was keenly aware of which design characteristics would provide the most effective system at the best price.

Contractual Arrangement

It would be easy for the government to put all the blame for the shortfall of the GMLRS IPT process on the prime contractor and, in fact, a cursory look (especially from the government's point of view) would certainly indicate that the contractor was the main contributor to the deficiencies with the three C's previously mentioned. However, the contractor's management philosophy that caused these problems was driven by the contract. Although the contract mentioned the IPT process and directed the contractor to follow this process, it also contained much status-quo language that opposed this process.

The IPT process calls for cooperation between the government and the contractor in developing the GMLRS design, which means that the government is demanding a certain level of authority in the design process. However, the contract still assigns total responsibility for the design and its cost to the contractor. If the government wants some design authority (which is necessary for an

LESSONS LEARNED FROM THE GMLRS IPT PROCESS

Douglas Love

*Although the IPT process
has resulted in some significant gains
for both the government and industry,
several changes must be made to
make the process more effective.*

IPT process), then the government must accept some of the responsibility for the final design and its costs.

One of the key incentives in the contract is performance awards for the contractor based on technical and budgetary performance. The government's primary goal is to get the best product for the money (non-recurring and recurring), and this requires more emphasis on technical performance, often at the expense of the budget. However, in actuality, performance against a budget is much more objective (thus, easier to ascertain) than against technical parameters. As a result, the budget gets higher recognition during performance evaluations, and gets higher priority with the contractor, leading to friction between the contractor and the government. The government wants more effort on the technical side, but the contractor sees that as a budget buster. The responsibility for both budget and technical performance falls totally on the contractor, therefore, the contractor gives more priority to budgetary concerns—much to the chagrin of government personnel who now feel left out of the process.

Insufficient Funding

The IPT process is advertised as a cost-savings approach to acquisition. As such, during the initial phases of acquisition, IPTs are often provided lower funding levels. In reality, the

IPT process requires more upfront funding to provide later paybacks in production and logistics savings, which makes investment in the IPT process worthwhile. Insufficient funding can also have a negative impact on an IPT's ability to attract required expertise from both the government and the contractor.

As previously noted, budget plays a big role in driving the contractor's management philosophy. Budgetary goals not only take priority (thus driving management decisions), but they also limit upfront activities that can save money in the future. In addition, budgetary goals can cause adverse relationships between the contractor and the government. For example, the government wants the contractor to explore alternatives that have potential for performance improvements or cost reductions, but the contractor sees these as additional expenses in terms of time and money that may have no payback. Budgetary constraints also drive the contractor to implement untested designs because testing delays the schedule and expends funds.

Recommendations

Although the IPT process has resulted in some significant gains for both the government and industry, several changes must be made to make the process more effective. Specifically, the government must replace the status-quo contractual

language and primarily address levels of effort and desired system characteristics. The government must also provide competent and reliable personnel to participate in the IPT process. Funding should be sufficient for the required activities and flexible enough to cover unforeseen problems or to implement changes that provide good economic returns. The contractor also needs to cooperate fully with the government and be adequately compensated.

Conclusion

It is abundantly clear that the primary burden for a successful IPT rests with the government. But the government must recognize that partial implementation of the IPT process will fall far short of expectations.

DOUGLAS LOVE is a Systems Analyst in the MLRS Project Office, Army Aviation and Missile Command, Redstone Arsenal, AL, and served as Lead Analyst for the GMLRS. He has a B.S.I.E. degree from the Georgia Institute of Technology and an M.S. in engineering management from the Florida Institute of Technology.



MFF parachutists in free-fall



Low-velocity airdrop (heavy drop)

THE AIRDROP CERTIFICATION PROCESS

Sandy White and Nora Campbell

New materiel destined for airborne units requires airdrop certification, which is the process that ensures that an item is suitable for use in an airdrop environment. Some items are certified prior to fielding while others are certified after fielding. Certification is the result of testing by the U.S. Army Test and Evaluation Command's (ATEC) Operational Test Command's Airborne and Special Operations Test Directorate (ABNSOTD) at Fort Bragg, NC.

Airdrop certification becomes official when airdrop rigging procedures are published in the appropriate training manual. Approval of the procedures results from operational airdrop testing conducted to validate draft rigging procedures, which are provided by the airdrop materiel developer at the Soldier Systems

Command in Natick, MA. When required, the Developmental Test Command (DTC) at Yuma Proving Ground, AZ, also a subordinate command of ATEC, conducts developmental airdrop testing.

The process that a program manager (PM) uses to obtain an airdrop certification for an item depends on the item under development. For example, if the item is to be worn by the soldier in conjunction with either a static line (SL) or military free-fall (MFF) parachute, it must not interfere with the parachute's deployment or pose a safety or health hazard.

In the case of SL and MFF, the airdrop item will require airdrop suitability evaluation. A safety recommendation for airborne usage is submitted to the DTC safety release authority. DTC then provides a safety release to the ABNSOTD so that oper-

ational airdrop testing can be conducted with representative user soldiers. The subsequent airdrop test report validates the item's rigging procedures and is published in either Field Manual 57-220 (*Static Line Parachuting Techniques and Training*) for SL personnel airdrops or Field Manual 31-19 (*Military Free-Fall Parachuting Tactics, Techniques, and Procedures*) for MFF operations.

Relative to a new vehicle or other heavy equipment, the PM may structure the acquisition strategy to field the item without airdrop certification if it is not specifically required in the Operational Requirements Document (ORD). The PM accepts the risk that the item may not be airdrop suitable without further design changes. If the item is destined for issue to airborne units, the PM should program funds for the item to

Airdrop certification, which validates an item's suitability, survivability, and operational effectiveness in an airborne environment, is an important element in the Army's acquisition process. It must not be overlooked if we truly want to provide the world's best equipment to our soldiers in the field.

be airdrop certified once the design is finalized, and have it certified during programmed operational testing before fielding to airborne units.

Not all ORDs are cross-walked with the Basis of Issue Plan (BOIP) that makes airdrop requirements a part of the overall program. The U.S. Army Training and Doctrine Command (TRADOC) has recognized that many items arriving at airborne units require airdrop certification in varying user-desired load configurations. Therefore, TRADOC sponsors a Force Development Test and Experimentation Program with the ABNSOTD to provide airdrop certification for items fielded to the XVIII Airborne Corps.

Personnel airdrop testing conducted by the ABNSOTD involves evaluating the item for airdrop suitability, survivability, and effectiveness. A common misunderstanding regarding personnel airdrop testing is that the certification only means that an item is safe to jump. In addition to being evaluated for safety, the item is also evaluated for operational effectiveness after the airdrop. If it does not survive the airdrop or will not function as designed after the airdrop, it is useless to the paratrooper. For example, if a new radio is carried inside the paratrooper's rucksack during an airdrop, and if it cannot withstand an impact of 22 feet per second, it merely adds unnecessary weight to the jumper's combat load. For this reason, PMs should not plan on having their items airdrop certified until all design improvements have been made and the item is production representative. This is also true of heavy drop items. If the crew cannot quickly derig the new vehicle or heavy equipment and move it off the drop zone, it can easily become a target rather than an asset.

Regardless of the item being developed, if the ORD does not specify airdrop certification, the PM should cross-walk the ORD with the BOIP prior to development. If the item is destined for airborne or special operations deployment, combat developers should determine airdrop certification requirements. The PM's early involvement with ATEC is also highly recommended so that the full scope of testing requirements can be commonly understood. Requirements can then be more realistically integrated into the PM's milestone schedule.

Airdrop certification, which validates an item's suitability, survivability, and operational effectiveness in an airborne environment, is an important element in the Army's acquisition process. It must not be overlooked if we truly want to provide the world's best equipment to our soldiers in the field.

SANDY WHITE is Chief of the Personnel Airdrop Test Branch, Airborne and Special Operations Test Directorate, Fort Bragg, NC. He has a B.S. in business administration from the University of Albuquerque, an M.S. in systems management from the University of Southern California, and is Level III certified in test and evaluation.

NORA CAMPBELL is Chief of the Editorial Branch, Airborne and Special Operations Test Directorate, Fort Bragg, NC. She is a Technical Editor who has more than 13 years of editorial and writing experience.

Introduction

As the Army transforms itself for the 21st century by developing a "system-of-systems" that interoperates seamlessly on the battlefield, it is also adding digital-age enhancements to fielded weapon systems such as the Abrams M1A2 tank.

In 1994, the Army contracted General Dynamics Land Systems (GDLS) to design system enhancements to the M1A2. In 1995, GDLS was awarded another contract to supply 240 of the enhanced M1A2s, with delivery scheduled to begin in 1999. The resulting M1A2 Systems Enhancement Package includes an embedded version of the tank commander's display unit for color digital terrain maps, an improved thermal-imaging sighting system that gives the tank gunner increased range, and an improved system for managing the tank's temperature. The enhancement package also includes improved data processing, an enhanced position-location reporting system, a radio-frequency digital communications system, and an improved crew intercom.

Component Vulnerability

Adding the new components to the M1A2 made it necessary for the Army to evaluate its vulnerability to threats the tank might encounter. The Army Developmental Test Command's Aberdeen Test Center (ATC), the Army Research Laboratory (ARL), the Army Evaluation Center (AEC), the Army Ordnance Center and School (OC&S), and other Army organizations are working as a team to conduct live-fire vulnerability tests on the enhanced M1A2.

ATC prepared a detailed test plan and will prepare a final report on the live-fire tests, which began in October 2000 at ATC ranges at Aberdeen Proving Ground (APG), MD. As the tester, ATC controls the ranges used for 16 shots that will provide data on ballistic threats; the data-collection instrumentation; operation, maintenance, and repair of test systems; data collection and documentation; and transmittal of data to supporting agencies and the test "customer"—the Army Training and Doctrine Command (TRADOC) Systems Manager/Abrams Tank System. ATC also conducts post-shot inspections and reviews data and damage

ASSESSING EFFECTS OF LIVE FIRE ON THE ENHANCED M1A2 TANK

Mike Cast

assessments as a member of the Damage Assessment Team.

ARL's Survivability/Lethality Analysis Directorate (SLAD) prepares a pre-shot predictions report and M1A2 damage assessment list, a tool used to determine how shot damage can affect systems operations. SLAD also collects various test data and assesses probable crew casualties, vehicle vulnerability, and loss of vehicle mobility and fire-power. SLAD helped prepare the test plan and will assist in preparing the final report. Additionally, SLAD chairs the Damage Assessment Team, which includes TRADOC representatives and a team from the OC&S. SLAD is also preparing a detailed damage assessment report.

AEC is the lead for independently evaluating test results and for preparing the live-fire test and evaluation strategy, the event design plan, and the system evaluation report. AEC also reviews ATC's test plan, observes testing, and evaluates damage assessments and the final test report.

The OC&S team prepared a battlefield damage assessment and repair (BDAR) support plan, a key part of ATC's test plan. The team also conducts, documents, and prepares an evaluation report of BDAR, which is included in the final test report.

Complex Assessment Process

According to Paul Kuss, SLAD System Leader for the Abrams Tank System, the damage assessment process can be complex because the analysis of shot damage must cover a broad spectrum of interactions between threat and target at component, subsystem, and system levels. He also said that the process involves thorough planning,

accurate data review, detailed analysis, and comprehensive reports covering test results and damage assessment.

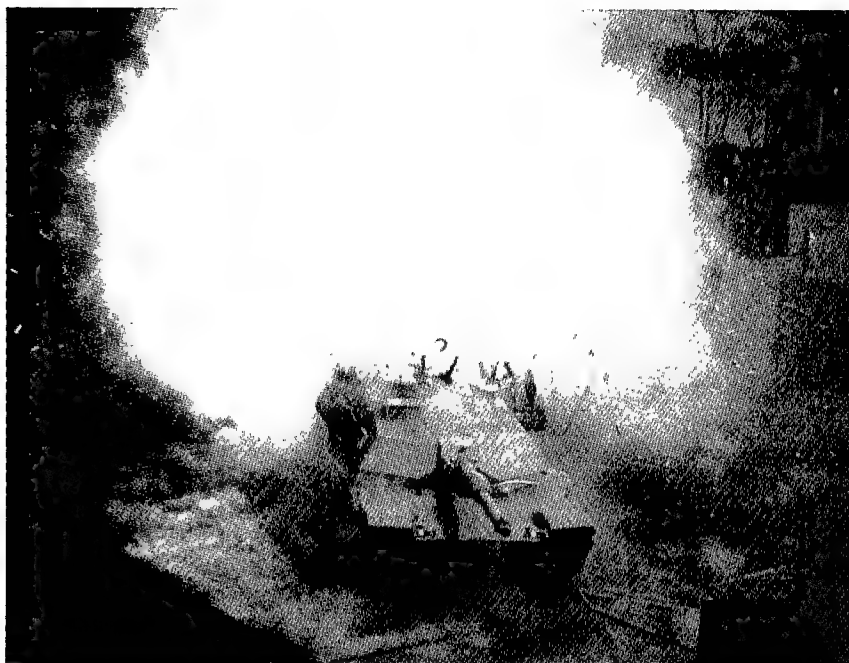
In developing the live-fire strategy, AEC chose munitions that posed a credible threat, based on historical anecdotes. These included munitions that penetrate or perforate armor to produce ballistic shock, blast, and fragmenting or spalling effects. Some of the munitions detonate above the vehicle rather than on impact, and some test shots involve static detonations rather than firing projectiles from a gun.

"The intent is to ensure that, with the new digitized components, there is no degradation in the M1A2's survivability," said AEC's Lawrence Kravitz, who chairs the Army integrated process team (IPT) for planning, conducting, and evaluating live-fire tests. He also said the tests are part of four phases proposed in the overall evaluation strategy. With 16 shots, AEC is trying to sample the universe of threats against the tank and relate them to components that may be vulnerable.

Testing Various Configurations

ATC is not only testing fully operational M1A2s, but also lesser configurations that are sufficient for determining the effects of live fire on various components. Most of the tests are conducted at ATC's Vehicle Vulnerability/Survivability Test Range. ATC's high-tech Depleted Uranium Containment Facility, also known as the "superbox," was used for some shots.

Kravitz said that knowing the vulnerability of components to live fire is important because the failure of even a single item can impair the tank's ability to operate. Testing at ATC is designed to enable evaluators to assess how



An M1A2 with Systems Enhancement Package takes a hit at an ATC range.

damage to one component or system in the tank could adversely impact the operation of other components. Kravitz explained, "That means looking at a criticality analysis or some kind of functional diagram of the vehicle and trying to imagine how a component's failure could affect other components electrically, mechanically, or hydraulically." ARL does the associated modeling and, after the test is completed, refines the model based on the demonstrated results.

Predictions Refine Testing

According to Kuss, before any munitions are fired or detonated, ARL's SLAD makes pre-shot predictions based on carefully calculated constructed component-level vulnerability models and/or engineering test experience. These predictions help testers structure live fire to obtain data with an optimal use of test resources. Additionally, the predictions help determine the spare parts needed to repair damage so that further testing can be conducted without delay.

The prediction process started a year or two before the live-fire execution. Although the IPT began to form in

mid-1997, prior to that time, the program manager tasked SLAD to determine whether a live-fire program was needed. An engineering analysis was performed, but some questions couldn't be answered because the effect of design changes on the vulnerability of the system was not known.

The Damage Assessment List developed with TRADOC's input relates damage from testing to various "kill" categories. A kill indicates a loss in function shortly after sustaining damage that cannot be repaired by a crew on the battlefield. A *mobility kill* means the tank would become incapable of executing controlled movements; a *firepower kill* indicates loss of ability to provide controlled direct fire; a *command-and-control kill* indicates loss of command-and-control functions; a *tactical kill* indicates loss of tactical functions; and a *catastrophic kill* means the tank sustained severe damage that couldn't be economically repaired.

Although M1A2 enhancements raised questions, previous test programs helped the Abrams tank incorporate improvements that reduced its vulnerability as it developed into the pres-

ent weapon system. Transitioning from the M1A1 to the M1A2, the Army significantly reduced ballistic vulnerability by adding dual, redundant components and data buses and distributing electrical power systems so all power controls were not in one place, Kuss concluded.

Testing BDAR

Kravitz noted that an important element of the test program was assessing the crew's ability to repair damage on the battlefield and to keep their tank in the fight. In fact, a goal of TRADOC—which is a participant in the live-fire tests—is to provide battlefield damage repair and recovery. TRADOC's role is to help the Army assess a crew's ability to repair a tank damaged by enemy fire, as well as test and refine standard procedures for battlefield damage assessment and repair.

After each shot, a report is prepared and incorporated with the information from ATC and ARL. The main objective is to get the tank back into the battle. At a minimum, it should have a "limp-home" capability. Now, with the Brigade Combat Team and "fast-fix forward," BDAR is going to play a much larger role than it has previously.

Conclusion

Lessons learned from live-fire testing on the M1A2 should be applicable to similar weapon systems. Said Kravitz, "With the particular model of tank that we're testing, we try to generalize and incorporate modifications or survivability enhancements into the whole universe of tanks. We also try to communicate the nature of the test program here, the nature of the threats to this vehicle, and aspects that should be considered in other test programs."

MIKE CAST is a Public Affairs Specialist with the Army Developmental Test Command at APG. He has a B.S. degree in journalism from Arizona State University. For nearly 20 years, Cast has held various Army positions in writing, editing, and photography.

NEW MEDICAL TECHNOLOGY FOR THE INJURED SOLDIER

LTC Todd H. Furse

Introduction

The Army Science and Technology (S&T) Master Plan and the Army Medical Department Modernization Plan are key elements in defining strategies and priorities for future combat casualty care medical technologies. In particular, the Army S&T Master Plan provides direction for development of medical technologies while the Army Medical Department Modernization Plan outlines investment strategies for modernizing military forces.

Combat casualty care modernization efforts include both forward resuscitation and stabilization treatment. This encompasses improved procedures for controlling hemorrhaging, revised resuscitation guidelines, and improved diagnostics and monitoring of injured personnel.

Battlefield mortality factors indicate that approximately 50 percent of deaths occur as a result of hemorrhaging, with remaining deaths split between central nervous system injuries and bacterial infection. The reduction in time that is often allotted for troops to deploy necessitates lighter and smaller equipment. This will hopefully be addressed by Army transformation plans that call for conversion of the Army into a light, mobile force requiring deployability of a brigade combat team within 96 hours after liftoff, a warfighting division in 120 hours, and five divisions in 30 days. Medical forces' mobility must be equal to the warfighters they support. In addition, as unit functions modularize, they must support containerized

equipment for rapid deployment. The priority of evacuation systems is paramount when considering the extended battlespace and lack of specialized care in theater. Therefore, new and improved platforms must be considered in future development. Some of the Army's medical modernization initiatives are discussed in the remainder of this article.

Soldier (Medic) Initiatives

The medic is the critical link for providing care to the seriously injured soldier. Next to the physician and physician's assistant, the medic is the first line of defense in providing critical care on the battlefield. When this article was written, the 91W Program was scheduled to begin Oct. 1, 2001. It will enhance the U.S. Army's forward medical capability through improved initial and sustainment training of medics.

Training will focus on improving trauma treatment and stabilization skills through national certification as an emergency medical technician (EMT) prior to graduation.

Controlling hemorrhaging is imperative to saving lives on the battlefield. Recent development of the dry fibrin sealant bandage could potentially reduce blood loss from battlefield injuries up to 85 percent. In animal studies, the hemostatic dressing has stopped hemorrhaging when applied directly to an injury. Further human clinical testing will be required. However, early results indicate this product could have lifesaving impact on future battle injuries.

In the future, the miniaturization of medical equipment such as the digital X-ray system, vital sign monitor, and lab test device will change how care is provided within the forward

*The medic is the critical link
for providing care
to the seriously injured soldier.
Next to the physician
and physician's assistant,
the medic is the first line of defense
in providing critical care
on the battlefield.*

area. More durable and smaller equipment originally designed for hospital applications is now becoming available for field use. The ultrasound scanner, a technology previously too bulky for field use, is now available in a portable hand-held unit that can provide images of internal organs used to evaluate internal bleeding. Another example is an electrically powered oxygen generator (under development) that will eliminate the need for bulky oxygen tanks.

Communications Initiatives

Medical Communication for Combat Casualty Care (MC4) is the Army's medical communication architecture and is fully integrated into all echelons of medical care. MC4 connects databases; administrative procedures; medical diagnostic, monitoring, and treatment systems; and evacuation platforms. Health care providers at all levels of care will be able to exchange information via digital, audio, video, and electronic media. Integrating medical information across health care echelons facilitates world-class service to soldiers. Some of the MC4 subcomponents under development are discussed below.

The Personal Information Carrier. This device provides a transportable medical record that is stored electronically on a microchip and retained by the soldier. Prototypes are the size of the soldier's dog tag and provide comprehensive personal readiness data in addition to critical medical data. Initial design criteria include a read/write capability so that information can be readily updated through a special reader, and memory to store a specified amount of information.

The Warfighter Physiologic Status Monitor. This is an active-status device that uses biosensors placed either directly on the soldier or indirectly on the uniform to monitor a soldier's real-time status. This sensor not only generates vital signs data (heart rate, blood pressure, respiration rate, body temperature), but it also monitors sleep and alert status, energy balance, psychological status, workload capacity, and stress. This wearable wireless sys-

tem can log sensor information and transmit it to a centralized data center. Further study is required to define algorithms and develop measurements to accurately report the soldier's status.

The Warrior Medic. This is an integrated system used in conjunction with the Land Warrior tactical network and has been dubbed the soldier's "911 system." Warrior Medic can alert the medic/commander of an existing casualty, make an emergency call for help, and identify and locate battlefield casualties. In addition, as an information system (similar to a personal data assistant), it allows the medic to record initial treatment, request assistance, and provide reference guides for treatment assessment.

Telemedicine. Another component of MC4 involves using video and audio conferencing to either exchange information or consult with a patient at a remote location. Telemedicine has been touted as the solution to providing critical surgical support to the far-forward battle zone. Telemedicine has been successfully used in treating patients in Operation Desert Storm, Somalia, and Kosovo. The general consensus is that availability of bandwidth and power requirements, coupled with durability of equipment, make this a less than desirable option for far-forward wartime applications.

Evacuation Initiatives

The Armored Treatment Vehicle (AMTV) Program's demise and the pending decision on the Armored Evacuation Vehicle's (AMEV's) continued development have left ground evacuation platforms in a state of uncertainty. This becomes an increasing concern as medical capability on the battlefield decreases and the need for patient evacuation increases.

The Medical Evacuation rotary wing UH-60Q replaces the UH-1V and upgrades the UH-60A helicopter with an additional materiel upgrade, while optimizing the aircraft for a medical evacuation mission. The UH-60Q can evacuate casualties as far forward as the situation permits; conduct combat search and rescue; perform shore-to-ship evacuation; and move medical

equipment and personnel in emergency situations. The helicopter's assets include an equipment storage area, onboard oxygen and suction, electric power for equipment, a combat litter system, and a hoist. The navigational system includes a global positioning system, a forward looking infrared system, and tactical air navigation equipment. Communication capabilities support all functions of MC4 for command and control and telemedicine, data bus, and high-frequency multiband radio.

Conclusion

Battlefield casualty experience indicates that approximately 50 percent of battlefield deaths result from hemorrhaging, with remaining deaths split between central nervous system injuries and bacterial infection. Although the number of injured soldiers who receive hospital care has declined steadily, battlefield mortality remains at 20 percent with no demonstrable decline, and is becoming the focus of advanced technology developments. Experience has also shown that the more rapidly medical treatment is available to injured soldiers, the greater the chance for survival.

The emphasis of new medical technology on the battlefield focuses on saving lives and will have a significant impact in decreasing battlefield mortality.

LTC TODD H. FURSE completed this article in partial fulfillment of MEL 1 requirements while serving as an Army War College Fellow assigned to the Center for Strategic Analysis, University of Texas at Austin. He holds a B.S. degree from the University of Nebraska and an M.P.H. degree from the University of Oklahoma. Furse is an Army National Guard Officer on Active duty (AGR), assigned to the U.S. Army Medical Command as the Senior Army National Guard Advisor, Fort Sam Houston, TX.

RAPID DETECTION OF INFECTIOUS DISEASE OUTBREAKS

MAJ Julie Pavlin, MC

Introduction

Wargamers, screenwriters, and novelists have described the impact of a microbial invasion on the United States. Military, law enforcement, and public health authorities have long predicted and planned for a deadly infectious disease outbreak in the United States, either intentionally introduced by terrorists or through a natural worldwide outbreak of a killer flu. In fact, multiagency exercises have confirmed that the ability to detect and track an outbreak is essential in dealing with this challenge. Early detection is particularly important for a quick and effective initial response. Tracking the potential epidemic is essential for managing the ongoing response, targeting resources, and evaluating intervention effectiveness.

Earlier detection of illness syndromes at the community level can greatly reduce the time needed to identify an outbreak. This results in a more rapid response and a significant reduction in illness and death. The response could include targeting limited assets (e.g., personnel and drugs), equipping civil government leaders with outcome-based "exposure" estimates, and using risk communication methods to

reduce the spread of panic and civil disruption.

DOD-GEIS

The Department of Defense-Global Emerging Infections Surveillance and Response System (DOD-GEIS) was established in 1997 to promote surveillance of emerging infections, integrate and improve public health practices, enhance response capabilities to new disease outbreaks, and support training and capacity building to combat emerging infections. The hub of the DOD-GEIS, located at the Walter Reed Army Institute of Research (WRAIR), works closely with all branches of the military in both CONUS and overseas locations.

*Earlier detection
of illness syndromes
at the community level
can greatly reduce
the time needed
to identify an outbreak.
This results in a more rapid response
and a significant reduction
in illness and death.*

ESSENCE

DOD-GEIS is a leader in developing a prototype community-based medical surveillance system called ESSENCE (Electronic Surveillance System for the Early Notification of Community-based Epidemics). ESSENCE is used for the early detection of infectious disease outbreaks in military populations.

In May 2001, DOD-GEIS was awarded Defense Advanced Research Projects Agency (DARPA) funding to continue developing an advanced biosurveillance system called ESSENCE II. For this project, DOD-GEIS teamed with several institutions under the leadership of the Johns Hopkins University Applied Physics Laboratory (JHU/APL). The focus of the 4-year project is to develop and transition an advanced, epidemio-

logically based biosurveillance system that will use diverse health indicator data to rapidly identify, define, and guide responses to bioterrorist attacks or other emerging infectious outbreaks in civilian, military, or mixed communities.

ESSENCE II will build on previous efforts by APL's biosurveillance system and DOD-GEIS ESSENCE. Other ESSENCE II team members include The George Washington University

School of Public Health, the Johns Hopkins University Bloomberg School of Public Health, Carnegie Mellon University, Cycorp, and IBM. Total funding for the institutions participating in this collaboration is more than \$8 million.

ESSENCE currently tracks syndromes based on a patient's signs and symptoms recorded during a doctor's visit instead of specific diagnoses that may rely on laboratory or other diagnostic procedures. The syndromic surveillance system performs a daily analysis of outpatient data from Washington, DC, area military treatment facilities (MTFs). Emergency rooms and primary care, internal medicine, pediatric, family practice, flight medicine, and occupational health clinics are included in the system. Because of the unique nature of their patients, infectious disease clinics are also included. The surveillance system includes 104 clinics in 21 different locations within a 50-mile radius of downtown Washington, DC.

Coding

A Standardized Ambulatory Data Record (SADR) is generated and matched with patient demographic data for every patient encounter within DOD. The provider fills in the SADR with applicable diagnoses from the International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM), along with the patient's disposition and other data. All encounters are coded near the time of encounter even if the cause of illness is not evident during the visit. Most ICD-9 codes chosen reflect this prompt diagnosis and may include syndrome-based codes such as cough and fever in addition to presumptive diagnoses such as pneumonia or influenza.

The SADR information is sent to a centralized database at the Tricare Management Agency (TMA). Data are fed directly to a secure computer at DOD-GEIS, allowing daily capture

of data from the Washington area clinics. This information is usually received within 1 to 3 days of the initial patient visit. Most important, collection of these data puts no additional reporting requirements on clinicians or clinic administrators.

Because significant variability exists in reporting among providers and clinics, similar ICD-9-CM codes are grouped together in nine syndromes that best represent noticeable signs, symptoms, and diagnoses. Grouping the codes decreases the data's variability and allows more accurate monitoring of the patient visit types. Establishing baseline levels of these syndrome groups for the Washington area allows daily monitoring of fluctuations. Significant changes can be quickly detected.

Historical Data

Expected numbers of syndromes for each of the groups are calculated using historical data. The daily count of reported syndromes is plotted against the expected number of cases. Any data points significantly higher than the number of expected cases could signal an unusual increase or decrease in a reported syndrome.

Off-the-shelf geographic information software is used to map the reported syndromes using patients' home zip codes. The data used for geographical viewing are updated daily. Mapping data points helps determine if a syndrome outbreak includes a geographic component and may aid in locating the source of the disease outbreak. Mapping also helps in predicting the extent of the affected population.

System Expansion

ESSENCE II will greatly expand the current system. A key addition will be an alert system for notifying when any syndrome group exceeds its normal range, as well as appropriate response protocols. Other planned enhancements include cap-

turing a broader range of health indicator data such as pharmaceutical disbursements, laboratory requests and results, and radiological requests and results from MTFs. Other non-medical health indicators that will be explored include school absenteeism and transit usage. These would be a separate but complementary and confirmatory source of data for models.

The partnership with JHU/APL will allow military and civilian communities in the Washington, DC, area to incorporate and coordinate information. Developing a syndromic surveillance system that best serves the entire region is important. Including data from civilian emergency rooms and managed care organizations as well as other health indicators will greatly enhance ESSENCE II's ability to rapidly detect an emerging outbreak.

In the wake of terrorist attacks on Sept. 11, 2001, ESSENCE has been expanded into other areas of the United States with relatively large numbers of military personnel. All MTFs in the United States send data to the TMA system that can be obtained and analyzed in a similar fashion. DOD-GEIS is exploring collaboration with other public health personnel in the military to set up similar systems in their locations.

MAJ JULIE PAVLIN, MC, is the Chief of Strategic Surveillance for the DOD-Global Emerging Infections Surveillance and Response System at WRAIR. She is a board-certified preventive medicine physician who served previously as a national and international consultant on medical biological warfare and terrorism while assigned to the U.S. Army Medical Research Institute of Infectious Diseases.

Rumsfeld's Rules

Shortly after returning for his second tour as Secretary of Defense in January 2001, Donald Rumsfeld released his *Rumsfeld's Rules*. First published in 1974 and revised in January 2001, these rules reflect the Defense Secretary's observations and lessons learned from his former assignments as Chairman of President Ford's transition team, White House Chief of Staff, a U.S. Naval aviator, a member of Congress, NATO Ambassador, Secretary of Defense, Middle East Envoy, business executive, Chairman of the U.S. Ballistic Missile Threat Commission, and other experiences. What follows from the DOD Link Web site are some of Secretary Rumsfeld's rules we found most interesting. We welcome your comments.

On Serving In The White House

- *Don't begin to think you're the President. You're not. The Constitution provides for only one.*
- *Learn to say "I don't know." If used when appropriate, it will be often.*
- *If you foul up, tell the President and correct it fast. Delay only compounds mistakes.*
- *Preserve the President's options. He may need them.*
- *You and the White House staff must be and be seen to be above suspicion. Set the right example.*
- *Don't blame the boss. He has enough problems.*

On Keeping Your Bearings In The White House

- *Don't think of yourself as indispensable or infallible. As Charles De Gaulle said, the cemeteries of the world are full of indispensable men.*
- *Have a deputy and develop a successor. Don't be consumed by the job or you'll risk losing your balance. Keep your mooring lines to the outside world—family, friends, neighbors, people out of government, and people who may not agree with you.*
- *If you are not criticized, you may not be doing much.*

On Doing The Job In The White House

- *Don't "over control" like a novice pilot. Stay loose enough from the flow that you can observe, calibrate, and refine.*
- *Test ideas in the marketplace. You learn from hearing a range of perspectives. Consultation helps*

engender the support [that] decisions need to be successfully implemented.

- *Look for what's missing. Many advisors can tell a President how to improve what's proposed or what's gone amiss. Few are able to see what isn't there.*

On Serving In Government

- *Beware when any idea is promoted primarily because it is "bold, exciting, innovative, and new." There are many ideas that are "bold, exciting, innovative, and new," but also foolish.*
- *Treat each federal dollar as if it was hard earned; it was—by a taxpayer.*
- *Public servants are paid to serve the American people. Do it well.*
- *If in doubt, don't.*
- *If still in doubt, do what's right.*

On Politics, The Congress, And The Press

- *The winner is not always the swiftest, surest, or smartest. It's the one willing to get up at 5:00 a.m. and go to the plant gate to meet the workers. (Unknown)*
- *If you try to please everybody, somebody's not going to like it.*
- *The most underestimated risk for a politician is overexposure.*
- *Don't necessarily avoid sharp edges. Occasionally they are necessary to leadership.*
- *Remember where you came from.*

For The Secretary of Defense

- *When cutting staff at the Pentagon, don't eliminate the thin layer that assures civilian control.*
- *Napoleon was asked, "Who do you consider to be the greatest generals?" He responded saying, "The victors."*

On Business

- *Reduce the layers of management. They put distance between the top of an organization and the customers.*
- *Know your customers.*

On Life (and other things)

- *Simply because a problem is shown to exist doesn't necessarily follow that there is a solution.*
- *The most important things in life you cannot see—civility, justice, courage, peace. (Unknown)*

FROM THE DIRECTOR ACQUISITION CAREER MANAGEMENT OFFICE

As the Army gears up to fight the war on terrorism, the Army Acquisition and Technology Workforce will be asked, indeed compelled, to respond to ever-changing priorities. First and foremost, we must ensure that the Legacy Force is ready, deployed, and sustained for the coming operations. Repair parts, ammunition, and all categories of supplies will be procured, stocked, deployed, and replenished in support of tactical operations. Program offices and engineers will procure and install the latest hardware and software upgrades on existing systems. Logisticians will handle the myriad of details necessary to ensure that all changes are incorporated into the logistics system and the right "stuff" is delivered to the right place at the right time.

Simultaneously, the transition to the Interim Brigade Combat Teams (IBCTs) needs to be completed and those units made combat ready. This new war will require the Army to operate across the full spectrum of operations. All capabilities must be fully manned and ready for action. Again, the challenges will fall directly on the acquisition workforce to increase the pace of production, integration, fielding, and support for the IBCTs.

As we accomplish all of these actions, defining and planning for the Objective Force continues, now with a greater sense of urgency. The U.S. Army has always been a leader in exploiting technology to improve lethality and survivability, and to offset larger forces on the battlefield. This has not changed; in fact, it is now even more important. Digging enemies out of rugged terrain is a nasty business, as is operating in built-up areas. Our combat forces will need all the enhancements and leverage that technology can provide. Our leadership needs your suggestions on technology that may have been previously overlooked for military application or evolving technology that will give us the decisive edge in times to come.

As in the past, the acquisition workforce is in a position to have real and immediate impact on operations to come. While we mourn the losses of Sept. 11th, 2001, we must still focus our minds and talents on doing all that we can to assist those on the front lines of this war, wherever those lines may fall.

COL Frank C. Davis III
Director
Acquisition Career
Management Office

Program Management Level II Certification

Effective FY02, the Defense Acquisition University's (DAU's) PMT 250 (Program Management Tools course) is required for Program Management Level II certification (only for those who are not already Level II certified). The course lasts 9 weeks and is offered every 2 weeks.

The first 8 weeks and 3 days are reserved for students to complete the first eight modules. They can complete them at their own pace, but must successfully finish the first eight modules at least 5 calendar days prior to the scheduled end date. The class end date is posted on the DAU home page at <http://www.dau.mil> (click on **DAU Virtual Campus**) and on the Army Training Requirements and Resources System (ATRRS).

The critical part of this course is the last 4 scheduled class days, which are Monday through Thursday. During these 4 days, the student must be available full time to participate and successfully complete modules 9 and 10. These modules require the formation of teams and completion of group assignments, and other training is not permitted.

ASK THE ACMO...

Are you interested in select leadership training and experience opportunities? Are you ready to take the step that will completely change your career? Then the Competitive Development Group (CDG) Program is for you. This 3-year professional development training program offers expanded leadership training and experience opportunities for competitively selected GS-12 and -13 (or equivalent personnel demonstration broadband level) Corps Eligible (CE) and Army Acquisition Corps (AAC) members.

The CDG Program provides members with the leadership training, education, and career-broadening experiences necessary to assume future Army acquisition leadership positions. It provides challenging and rewarding developmental assignments and gives members an edge when competing for promotions.

To foster greater interest in the CDG Program, the Acquisition Career Management Office (ACMO) has devoted this Ask The ACMO article to some of the most frequently asked questions about this highly regarded program.

Is it easy to apply? Yes, the only requirements are that an applicant be a CE or an AAC member and be Level III certified in an acquisition career field. Application packages must include a signed Acquisition Career Record Brief (ACRB), a completed Senior Rater Potential Evaluation (SRPE), your three most recent performance appraisals, your resume, a signed mobility statement, a data self-certification form, and your most recent SF-50.

Why should I apply? If you desire career-broadening, multifunctional experiences that will prepare you for a vari-

CAREER DEVELOPMENT UPDATE

ety of acquisition leadership positions, not to mention an increase in your marketability, you should apply. Another reason to apply is that numerous senior-level acquisition positions are expected to be available during the next few years as the result of a large number of retirements.

Is it difficult for you to schedule, or have you been denied, training, education, and developmental opportunities in your current position? Do you want a change? If you answered "yes" to these questions, or if promotional opportunities in your current organization are limited, you should apply to the CDG Program!

Will I have to relocate? Relocation for CDG members is rarely required. To date, all geographic moves have been voluntary (10 since the program's inception in 1997). No CDG members have had to relocate to a nonpreferred geographical region—these moves are only necessary when a member cannot receive the experience necessary to meet the goals and objectives of the AAC and the CDG Program.

"Since I am from the Washington, DC, metro area, there were numerous career-broadening assignments available locally. There was never a fear of having to relocate. I found this to be true when talking to other CDG members as well."

—Steve Tkac, YG01, promoted 2001

What if I don't get promoted after 3 years? Although the program doesn't guarantee promotion, statistics have shown that CDG members have an edge when competing for promotions. Seventy-nine percent of year group (YG) 97 and 74 percent of YG98 personnel have been promoted to GS-14 (or equivalent personnel demonstration broadband level) positions. CDG members are best-qualified applicants selected through a competitive selection board process. Participation in the program increases a CDG member's competitiveness for developmental assignments throughout the acquisition community. Additionally, members are provided centrally managed education and training opportunities designed to provide leadership development experiences in a structured and highly visible program.

"Without the CDG Program, I never would have been promoted as soon as I was. The experience and training that the CDG Program affords its members provides a great competitive edge when competing for job vacancies. The DOD leadership is looking for multifunctional leaders of tomorrow, and the CDG Program prepares you for such a challenge."

—Bernie Gajkowski, YG01, promoted 2001

Is the application package difficult to put together? I don't know if I have time. The application package is not difficult to assemble. Most workforce members already have their resume, a recent SF-50, their ACRB, and their last three performance appraisals. Senior raters fill out the SRPE, and the other forms only require a signature. You can update your ACRB by contacting your regional Acquisition Career Manager (ACM). To identify your ACM or to access these forms, go to <http://dacm.rdaisa.army.mil> and click on **Your Acquisition Career Management Team or Forms**. It's that easy.

"The small amount of time it took to prepare my application package was well worth the challenging and rewarding experiences that the CDG Program offers. Your career is what you make of it, take the next step."

—Amelia Hatchett, YG98, promoted 1999 and 2000

It's too competitive. Do I really have a chance of being selected? Yes, the CDG Program is competitive, and it's designed that way. As a result, it is the premier leadership development program within the AAC. However, if your experience, training, and education demonstrate a desire for continuous learning and career-broadening opportunities, you probably have what it takes to be competitive for this program. The ACMO is looking for individuals who have leadership potential for the 21st century.

My agency managers don't encourage participation in such programs. What should I do? A supervisor's responsibility is to encourage and support his or her employee's career development. In fact, career development is a stated mission of the ACMO and AAC policy. Keep in mind that application and acceptance to the CDG Program does not require your current supervisor's approval. If you are selected for the CDG Program, you are assigned a new position within the Army Acquisition Executive Support Agency's Table of Distribution and Allowances.

For more information about the CDG Program, contact your ACM or contact Maria Holmes at (703) 604-7113 or Maria.Holmes@saalt.army.mil. To determine the name of your ACM or to contact current CDG members, go to the Web site listed previously. This site also addresses a number of misconceptions about the program such as mobility, promotion, and application issues and will help you better understand the benefits of the CDG Program. Please don't pass up this opportunity—take the next step!

45 Graduate From MAM Course

In August 2001, 45 students graduated from the Materiel Acquisition Management (MAM) Course, Class 01-004, at the Army Logistics Management College, Fort Lee, VA. Five international officers were among the students: two from Japan, one from South Korea, one from Malaysia, and one from Romania. The Distinguished Graduate Award was presented to MAJ Vincent F. Malone.

The 7-week MAM Course provides a broad perspective of the materiel acquisition process and implementation and includes a discussion of national policies and objectives that shape the process. Areas of coverage include acquisition concepts and policies, research and development, test and evaluation, financial and cost management, acquisition logistics, force integration, production management, risk assessment, and contract management. Emphasis is on developing midlevel professionals to effectively manage the acquisition process.

Research and development, program management, testing, contracting, requirements generation, logistics, and

CAREER DEVELOPMENT UPDATE

production management are some of the materiel acquisition work assignments offered to MAM Course graduates.

PERSCOM Notes...

SSC Selection Board Results

Results of the Senior Service College (SSC) Selection Board were released Aug. 7, 2001. The board selected 23 members of the Army Acquisition Corps (AAC) to attend SSC during academic year (AY) 02/03. Two of the officers selected were revalidated from the AY 01/02 list. The AAC had 382 officers eligible for selection to SSC and had a selection rate of 7.1 percent. The Army selection rate was 7.7 percent.

Selectees were all former or current product managers or acquisition commanders. The majority of selectees (70 percent) were year group (YG) 81-82 officers; the remaining 30 percent were evenly split between YGs 80 and 83. All selectees had at least one command Officer Evaluation Report in their board file. Generally, selectees had an above center of mass (ACOM) or COM(+) performance file overall and a COM(+) performance in command. In addition, selectees had an average of 1.6 command reports in their board file.

Each officer selected for attendance at SSC was sent a letter from the U.S. Total Army Personnel Command's (PERSCOM's) Acquisition Management Branch (AMB) explaining how to access the PERSCOM Officer Career Management Knowledge Center. The letter also contains a synopsis of each SSC and available fellowship. Officers will provide their SSC preferences online through the Knowledge Center. Selectees may choose to attend resident SSC, enroll in the Army War College Distance Education Program for AY 02/03, or decline. SSC selectees normally attend the Army War College, the Air War College, the Acquisition Fellowship at the University of Texas (Austin) (UT-Austin), or the Industrial College of the Armed Forces (ICAF). The latter three choices have limited seats. ICAF and UT-Austin tend to be the two programs for which there are more officers wanting to attend than available seats.

Further, ICAF has special considerations: officers who are joint Service officers and have been awarded an additional skill identifier of 3L are ineligible to attend, and 50 percent plus one of the attendees (by branch) must be assigned to a joint position immediately following school. Therefore, it is important that selectees give as much consideration to their second and following choices as they do to their first choice.

The SSC alternate list is not formally published; however, officers selected as alternates will receive a letter in the December 2001 timeframe that informs them of their status. AMB will only be given the list of officers who are considered high alternates (those officers who are most likely to be activated to attend SSC). AMB does not expect to receive this list until mid-December.

The names of selectees are listed below. An asterisk indicates those officers revalidated from the AY 01/02 SSC list. All selectees are lieutenant colonels.

Abercrombie, Henry
Bonheim, Michael
Brewster, Robert
Chasteen, Gregory
Colon, Angel
Coutteau, Charles
Crizer, Scott
*Davis, Darrell
Driessnack, Charles
Goddette, Timothy
Greene, Harold
Hansen, Richard

Harris, Earnest
Jones, Kermit
Jones, Raymond
McNerney, Catherine
Moshier, Timothy
Mullin, Edward
*Noonan, Kevin
Scarborough, Jess
Sears, George
Sutton, Brian
Williams, Curtis

FY02 Army Experimental Test Pilot Board

A U.S. Total Army Personnel Command (PERSCOM) board will convene on or about Feb. 18, 2002, to select aviators best qualified to participate in the Army Aviation Experimental Test Pilot Training Program. This board will review and select both commissioned and warrant officers. Commissioned officers selected to attend the U.S. Naval Test Pilot School (USNTPS) are automatically accessed into the Army Acquisition Corps, where they will serve for the remainder of their careers. Warrant officers will continue to be managed by PERSCOM's Warrant Officer Division.

For commissioned officers to be eligible, they must have a bachelor's degree in an engineering discipline or hard science, be a captain or major, have at least 7 years of active federal service, be branch-qualified prior to attendance at USNTPS, and have a minimum of 700 hours total flight time.

For warrant officers to be eligible, they must have an associate's degree with above-average grades; have completed college courses in algebra, calculus, differential equations, and physics (or mechanics) with above-average grades; and be a chief warrant officer 2 or higher. In addition, candidates must have completed military education level for current grade prior to attending the test pilot training program, have 1,000 total flight hours, and have sufficient time remaining upon completion of training to complete the Active duty service obligation.

Highly desirable qualifications for commissioned officers include successful completion of college courses in mechanics (solids, fluid, flight), thermodynamics, aerodynamics, control theory, and advanced mathematics, with above-average grades; experience in complex aircraft such as the CH-47, UH-60, AH-64, OH-58D, and/or fixed-wing military aircraft; and rating as an instructor pilot, instrument flight examiner, or maintenance test pilot. Pilot-in-command flight hours are weighted accordingly in the selection process.

Anyone in a position to recommend and endorse an applicant is urged to make a thorough appraisal of that applicant's flying ability, operational experience, motivation, adaptability, and ability to communicate orally and in writing.

CAREER DEVELOPMENT UPDATE

All FY02 Experimental Test Pilot Board applications must be received at PERSCOM no later than Jan. 11, 2002. Applications must include an official transcript of college credits; a copy of the aviator's most current DA Form 759, *Individual Flight Record and Flight Certificate-Army*; and endorsements by an instructor pilot or standardization instructor pilot commenting on the applicant's flying ability. Both commissioned and warrant officer applications should be mailed to Commander, U.S. Total Army Personnel Command, ATTN: TAPC-OPB-E (MAJ Bochonok), 200 Stovall Street, Alexandria, VA 22332-0411.

Experimental test pilot assignments will be based on the Army's needs. Initial tours will be served at the Aviation Technical Test Center, Fort Rucker, AL, or the Aviation Applied Technology Directorate, Fort Eustis, VA. USNTPS graduates will serve in experimental test pilot or organizational staff positions that directly affect the type, design, and configuration of Army aircraft.

For additional information, view our Web site at http://www.perscom.army.mil/OPfam51/experimental_test_pilot_info.htm or contact MAJ Jeff Bochonok at DSN 221-2800, (703) 325-2800, or Jeffrey.Bochonok@hoffman.army.mil; or CW3 Kimberly Young at DSN 221-5251, (703) 325-5251, or Kimberly.Young@hoffman.army.mil.

FY01 Major Promotion Board Results

The FY01 Major Promotion Board results were released Aug. 28, 2001. This article analyzes the board results.

Acquisition Corps Results

Board members reviewed the files of 136 Army Acquisition Corps (AAC) officers in the primary zone of consideration for promotion. From this population, the board selected 111 officers. The resulting primary zone selection rate of 81.6 percent is 2 percent higher than last year. There were 31 AAC officers considered for above-the-zone promotion, and the board selected 17. The above-the-zone AAC selection rate is 54.8 percent, which is 20 percent higher than the Army average of 34.3 percent. In addition, one officer was selected below the zone.

Trends For Selectees

Selection to major is primarily a reflection of how an officer performs in his or her basic branch assignments. Most AAC officers have few, if any, Officer Evaluation Reports (OERs) from acquisition assignments when the Major Promotion Board considers them. Many officers are still completing basic branch assignments, Reserve Officer Training Corps recruiting, Active component/Reserve component assignments, or attending advanced civil schooling. Thus, AAC officers are judged against the same criteria as basic branch officers.

Second lieutenant OERs have been purged from officers' files and were not reviewed by the promotion board. The most important discriminator continues to be company command OERs, and board members appear to use

command reports as the measure of an officer's ability to succeed as a major.

With a majority of the officers receiving "one block" command DA Form 67-8 OERs, the senior rater narrative was extremely important in determining the strength of an OER. Senior rater narratives that quantified an officer's performance when the profile did not, sent a clearer picture to the board on the "true block check" (i.e., best officer in a command, top 5 percent, 3 out of 10.) Additionally, senior rater narratives that focused on an officer's potential were generally more effective than OERs that focused on how the officer performed. Officers with overall center-of-mass (COM) files and "top block" COM command OERs were at risk for promotion. The new DA Form 67-9 OER eliminates the confusion for the board by clearly communicating the senior rater assessment on officers they place above center of mass.

Performance in basic branch assignments, especially company command, appeared to be the board's focus. The message is clear: seek company command, do well, and maintain a high level of performance on all other assignments.

The names of AAC officers selected for promotion to major are shown below. An asterisk indicates a below-the-zone selection.

MAJOR PROMOTION LIST	BRANCH
Acostarobles, H.	SC
Arner, Justine A.	SC
Bailey, Michelle M.	AV
Bamburg, James A.	AV
Barrie, Robert L.	AV
Bassett, Thomas C.	TC
Becker, Glenn B.	AG
Bell, Arrita D.	MI
Boerjan, Robert A.	MI
Bristol, David P.	AV
Cash, Jonathan G.	SF
Cashman, Michael S.	IN
Cathcart, Eric R.	OD
Chambers, Floyd	QM
Clements, Andrew F.	FA
Cote, Courtney P.	AV
Cote, Jeffrey A.	MP
Crockett, Jeffrey L.	SC
Culclasure, Harry R.	FA
Cummins, Robert W.	AG
Davila, Tony O.	MI
Devine, Craig E.	SC
Devries, Lambert D.	FA
Dixon, Ernest III	OD
Dove, Michael J.	OD
Edens, Clayton W.	SF
Ferguson, Cary V.	TC
Ferreira, Jay M.	OD

CAREER DEVELOPMENT UPDATE

Fugate, Thomas M.	AV
Fullmer, Shane N.	AR
Gautreaux, Jay P.	AV
Gloor, Thomas B.	MI
Greene, Willie B.	AG
Grimes, John H.	OD
Hall, Lamar W.	AR
Hall, Richard M.	FA
Harris, Michael W.	FA
Hearon, Robert W.	FA
Helms, Robert A.	MI
Herres, Roger A.	TC
Hight, William B.	FA
Hilton, Norman A.	IN
Hollingsworth, S.	SC
Holmes, Angela M.	AD
Hughes, Frederick J.	QM
Hunt, Kristen L.	SC
Hunt, Philip D.	FA
Hunter, Michael D.	CM
James, Kenneth T.	AG
Jennings, Marvin R.	MI
Johnson, Jason T.	QM
Johnston, Vincent F.	CM
Jones, Richard D.	OD
Kastanek, Kerry W.	MI
Kennedy, James R.	AV
Kim, Yu Shik	AD
Kirk, Eric D.	QM
Krause, Karl S.	FA
Kreun, David R.	MI
LaChance, Eric M.	EN
LaFlamme, Mark H.	IN
Lee, Cedric D.	OD
Lee, Jong Hyuk	AV
Lopez, Harold W.	EN
Ludwig, Steven E.	AR
Lynch, Christopher	AV
Matt, Michael S.	MI
May, Charles H.	EN
McCaa, Ramona M.	MI
McGhee, Alonzo B.	MI
McGuire, Keith Q.	IN
*McRae, Timothy	MI
Messer, Kevin K.	AD
Milner, Michael W.	AR
Minners, Bradford A.	AG
Mobley, Kevin D.	AV
Morano, Anthony M.	MP
Moses, Kathaleen D.	AD
Munster, Matthew G.	AR

Murrah, Michael R.	EN
Nakano, Victor M.	EN
Nash, Kevin M.	AR
Nix, Timothy G.	SF
Nugent, John O.	AV
Oderkirk, Andrew D.	IN
Odum, Marcus J.	MI
O'Neill, John B.	AV
Parodi, Michael A.	SC
Passapera, Pedro R.	SC
Perkins, Russell B.	IN
Perry, Sharlene J.	OD
Peterson, Samuel L.	AR
Phillips, Mark E.	QM
Piatt, Eric A.	SC
Pooler, Susan D.	MI
Rew, Scott A.	OD
Riddick, James A.	MI
Robare, William M.	AD
Robison, Bryan S.	IN
Rodriguez, Michael	MI
Russell, William M.	MI
Sanner, Michelle A.	SC
Santiago, Derek A.	TC
Schertler, Patrick	AV
Schirmer, James W.	AV
Schliesman, Steven	AG
Shepard, Benny L.	AD
Sherman, Cynthia M.	MI
Shore, Thomas F.	QM
Sigler, Robert R.	CM
Smalls, Douglas E.	MI
Smith, Charles H.	AG
Smith, Keith A.	IN
Stephan, Allen H.	AV
Stephens, Bryan J.	MP
Stewart, Maurice H.	SC
Sumner, Lance L.	SC
Terrell, Paul D.	AR
Tschida, Carol M.	AV
Tyler, Scott A.	AR
Tyson, Rodney D.	QM
Vanyo, Kevin A.	AR
Vitale, Joseph L.	AG
Wall, Steven T.	SC
Watiti, Tom W.	SC
Williams, Kevin D.	AV
Williamson, John K.	IN
Witherspoon, Willie	FA
Wizner, Anthony M.	AR

CAREER DEVELOPMENT UPDATE

FY02 COL/GS-15 PM/AC Slate

The U.S. Total Army Personnel Command recently released the FY02 Colonel (COL)/GS-15 project manager (PM)/acquisition command (AC) slate. Unless otherwise indicated, all of the personnel listed below are lieutenant colonel promotable.

NAME	SLATE
Bianca, Damian P.	NATIONAL MISSILE DEFENSE GROUND BASED INTERCEPTOR
Bianco, Stephen G.	CONTRACTING COMMAND KOREA
Bowman, Michael	NIGHT VISION/RECONNAISSANCE SURVEILLANCE AND TARGET ACQUISITION
Buck, Stephen D.	SIGNALS WARFARE
Burke, John D.	TACTICAL UNMANNED AERIAL VEHICLES
Crosby, William T.	CARGO HELICOPTERS
Defatta, Richard P.	SHORT RANGE AIR DEFENSE
Dietrick, Kevin M.	WARFIGHTERS SIMULATION
Ernst, Adolph H. III	GROUND APPLICATIONS PROGRAM OFFICE
Fox, Steven G.	TACTICAL EXPLOITATION OF NATIONAL CAPABILITIES
Gavora, William M.	AVIATION APPLIED TECHNOLOGY DIRECTORATE
Grotke, Mark L.	DCMC SPRINGFIELD
Heine, Kurt M.	JOINT LAND ATTACK CRUISE MISSILE DEFENSE ELEVATED NETTED SENSOR SYSTEM
Hrды, Russell J.	CRUSADER
Janker, Peter S.	FIRE SUPPORT ARMAMENTS CENTER
Johnson, Michael E. (COL)	JOINT BALLISTIC MISSILE TARGETS
Kallam, Charles T.	DEFENSE CONTRACT MANAGEMENT COMMAND (DCMC) MIDDLE EAST
Martin, Edwin H.	DCMC SAN FRANCISCO
Maxwell, Jody A. (COL)	COMMON MISSILE
McCoy, Curtis L.	BRADLEY FIGHTING VEHICLE SYSTEMS
Mills, Ainsworth B.	DCMC PHILADELPHIA
Nenninger, Gary S. (CIV)	AVIATION MAINTENANCE SUPPORT SYSTEMS
Noonan, Kevin S.	COMBINED ARMS TACTICAL TRAINERS
Pallotta, Ralph G.	APACHE ATTACK HELICOPTER
Pecoraro, Joseph E.	DEFENSE SUPPLY SERVICE WASHINGTON
Price, Nancy L.S.	DEFENSE COMMUNICATIONS AND ARMY TRANSMISSION SYSTEMS
Rasmussen, Valerie A.	INFORMATION SYSTEMS DEVELOPMENT CENTER, FORT LEE
Schmidt, Rodney H.C.	DCMC RAYTHEON
Sledge, Nathaniel H.	ARTILLERY MUNITIONS SYSTEMS
Smith, Michael	NATIONAL MISSILE DEFENSE X-BAND RADAR
To Be Announced	DEFENSE COMMUNICATIONS AND ARMY SWITCHED SYSTEMS
Sutton, James C. (CIV)	MINES, COUNTERMINE, AND DEMOLITIONS

La Salle University Recognizes USAMRICD

Philadelphia-based La Salle University and the U.S. Army Medical Research Institute of Chemical Defense (USAMRICD) are working together for mutual benefit thanks to the efforts of Dr. Gerald P.H. Ballough from La Salle and Dr. Margaret Filbert from USAMRICD.

During university recesses over the past 7 years, Ballough, an Associate Professor of Biology at La Salle University and former National Research Council Associate at USAMRICD, has returned to the Neurotoxicology Laboratory at USAMRICD to continue his research. Currently concentrating on ways to circumvent damage from nerve agent exposure, Ballough and Filbert conduct research and offer guidance to student researchers, many of whom are among the top science majors at La Salle.

Recognizing the research education contributions of USAMRICD to La Salle students, the university presented

an engraved plaque to both Filbert and USAMRICD. "Thank you to the U.S. Army Medical Research Institute of Chemical Defense for providing excellent research and career opportunities to La Salle students over the last 6 years. We look forward to many more years of continued cooperation," said Dr. Margaret MacManus, Dean of La Salle University's School of Arts and Sciences.

COL James A. Romano Jr. accepted the award on behalf of MRICD, thanked the university for the recognition, and acknowledged the efforts of Ballough and other institute researchers and staff who participate in guiding future scientists. He said that the institute strives to provide a bridge for young scientists and encourages research for the benefit of American soldiers and U.S. allies. In addition, he acknowledged the efforts of Ballough and the entire team of scientists at USAMRICD, many of whom recruit bright talent and offer encouragement and guidance to summer hires and interns.

Warranties: Planning, Analysis, And Implementation

By James R. Brennan

McGraw-Hill Inc., New York, 1994

Reviewed by Roy A. Pellegrino, Command Warranty Program Manager at the U.S. Army Communications-Electronics Command, Fort Monmouth, NJ.

The author's intent in writing *Warranties: Planning, Analysis, and Implementation* is to clarify the meaning of warranties and provide guidance as to the planning, analyses, and application of effective warranties in consumer, commercial, and military business sectors. The majority of discussion, however, deals with the military sector.

In Brennan's opinion, it has become obvious, especially in the military sector, that warranties have been poorly conceived and less than diligently implemented. With this book, Brennan aims to provide practical insight to suppliers and customers that will result in benefits to each—a win-win situation regarding warranties.

Chapters 1 and 2 describe essential warranty principles including realities of warranties, types of warranties, risk issues, and reliability considerations. In addition, the author stresses the importance of product reliability in the warranty process.

Chapter 3 discusses warranty legislation in all three sectors, including the now repealed Title 10, U.S.C. Sec. 2403, *Major Weapon System Contractor Guarantees*.

Chapters 4 and 5 explain the concept and application of fixed-price repair warranties and performance guarantees, respectively. The author stresses the importance of how warranties are structured so that the better the reliability, the better the supplier's profits and the higher the customer's product satisfaction level.

Chapters 6 and 7 describe the trade-offs required before preparation of the warranty requirement and the methodology of warranty costing, respectively. The author discusses key trade-off issues, the trade-off process, and trade-off examples. Additionally, he stresses the need for Monte Carlo simulation techniques for warranty costing.

Chapter 8 develops the warranty-negotiating process between supplier and customer. The author stresses the importance of detailed supplier and customer preparation, good-faith cooperation, and patience to enhance the likelihood of a win-win outcome.

Chapter 9 develops a cost-effectiveness analysis methodology. Because not all warranties are cost-effective, it is the customer's responsibility to make estimates throughout the development program relative to the likely cost-effectiveness of the warranty on product fielding.

Chapter 10 discusses the implementation and administration of the negotiated warranty. The author places heavy emphasis on thorough databases for product tracking, adequate staffing for efficient warranty administration, supplier or customer review boards, and good will as important ingredients for success.

Chapter 11 addresses the development process for warranties including the importance of thorough planning, activities required during each program phase, warranty alternatives selection factors and processes, contractor development activities, and the importance of the warranty team.

Chapter 12 examines the future of warranties. Brennan projects what it will take relative to quality and reliability levels for suppliers to survive in the 21st century, and the associated impact on warranty duration and coverage.

Brennan provides a book that clears up misconceptions related to development and administration of both commercial and government warranties. As the government adopted warranties in an attempt to resolve existing quality and logistical problems, misconceptions arose that affected the development and implementation of warranties. Each chapter provides sufficient detailed information for individuals with limited warranty knowledge to develop and negotiate cost-effective warranties.

The only drawback to this book is that it still references Title 10, U.S.C. Sec. 2403, which was repealed in November 1997. The new government warranty requirement appears in the Federal Acquisition Regulation (FAR), Subpart 46.7, *Warranties*.

Brennan provides an excellent presentation of all facets of the warranty process. With the information provided in this book, individuals should gain an excellent understanding of warranty characteristics. I highly recommend this publication to anyone wishing to explore the world of warranties.

100 Profiles of Sergeants Major of Color: Black Americans Who Paved the Way for Others to Follow

By Command Sergeant Major (CSM)

Harold Hunt (USA, Ret.)

Hunt Enterprises, Hanover, MD, 2000

Reviewed by Joe Sites, Vice-President/Director of Defense Systems, BRTRC Inc., Fairfax, VA.

The author, CSM Harold Hunt, had a distinguished career in the Army. He served his final Active duty assignment as CSM of the U.S. Army Laboratory Command. Hunt also served previously in prestigious assignments that included CSM of the U.S. Corps of Cadets at the U.S. Military Academy; CSM of the 3rd U.S. Infantry Regiment, "The Old Guard"; and in the 1st Battalion, 23rd Infantry "Tomahawks" Regiment.

Hunt dedicated the book to CSM Louis C. Perry and all sergeants major who over the years have made a difference—regardless of their race, creed, or color. In the dedication, Hunt states that his purpose in writing the book is to bring recognition to many individuals whose satisfaction

came from knowing that they were doing their duty to the best of their ability. In view of Hunt's truly outstanding service, his recognition of others who preceded him and his appreciation for what they did is especially meaningful.

Although the book only allocates slightly more than one page per each of the 100 chosen representatives, each biography is concise and informative and tells the story of individuals who made great contributions, not only to the Army but also to the Air Force, Navy, Marine Corps, and National Guard. More important, they made great contributions to our Nation. Included in this list of male and female heroes are CSMs who served in the Civil War, the Spanish American War, World War I, World War II, the Korean conflict, Viet Nam, and Desert Storm.

It is difficult to select specific examples from such a distinguished list; therefore, to illustrate the wide variety of experiences, the following examples are provided. The first individual in the book, Joseph R. Allen, is a veteran of Desert Storm.

A number of CSMs who served during the Civil War are also included in the book. For example, as the result of the battle of Chapin's Farm near Richmond, VA, on Sept. 29, 1864, 13 black soldiers received high decorations. The following winners of the Medal of Honor are also highlighted: Alfred B. Hilton, Christian A. Fleetwood, and Thomas R. Hawkins. Further, on July 12, 1863, at the battle of Fort Wagner, SC, 1,500 black soldiers of the 54th and 55th Massachusetts Colored Regiments sacrificed their lives. Among the survivors, William H. Carey won the Medal of Honor.

The CSMs in this book not only won military battles, they also excelled in the fields of education, training, sports, and moral leadership. For instance, CSM Edward Crook Jr. won an Olympic gold medal for boxing.

CSM Gary K. Simons is quoted as saying, "God has helped me get through a lot of difficult times in my life, and my family has been very supportive. And this country is the greatest on earth. I feel so proud when I put on this uniform." In reading this book, one is left with the feeling that Simons' words could be those of each of the CSMs whose short histories are provided. In turn, we can all be proud of these great Americans to whom we owe so much. We should also be appreciative for the author's work in bringing their stories to our attention.

Reviewer's Note: Although not included in the book, CSM Oscar Jackson, who was my colleague and friend in the 101st Airborne Division in Viet Nam, should also be recognized. Jackson obtained an advanced degree after retiring from the Army and became a Minister of Music in Killeen, TX.

A Guide to the Project Management Body of Knowledge (PMBOK® Guide)—2000 Edition

Project Management Institute, 2000

Reviewed by LTC Kenneth H. Rose (USA, Ret.), a Project Management Instructor for ESI International, residing in Hampton, VA, and a former member of the Army Acquisition Corps.

Project management is an evolving craft. No stone tablets exist that prescribe procedures to be used now and for all time. Recognizing this, the Project Management Institute has issued *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)—2000 Edition*, an updated version of its comprehensive collection of generally accepted tools, techniques, and practices.

This new edition is neither a totally new view of the project management world nor a bits-and-pieces revision of an existing text. It is a thoughtful next step taken under the guidance of experience and collective judgment of a broad range of practitioners. A brief preface describes what is new, giving readers an overview of value added and a roadmap in finding new information.

The book retains its original general format. However, readers may notice small, subtle changes in graphics, fonts, and layout that allow improved clarity of presentation. It is available in softcover, hardcover, and CD-ROM, meeting the needs and interests of all potential users.

Risk management is the area of most significant expansion. This area was a bit thin in the 1996 edition, but not anymore. Chapter 11, Project Risk Management, was rewritten to include six newly defined processes—risk management planning, risk identification, qualitative risk analysis, quantitative risk analysis, risk response planning, and risk monitoring and control. The new approach brings risk management into its rightful place as a critical element of project success and provides readers with a practical methodology, not just general theory or good advice.

Another significant contribution of this edition is a matrix that maps the relationships among the 9 project management knowledge areas, the 5 process groups, and the 39 project management processes. Most readers would do this anyway. The published matrix provides a direct, readily available resource for "the big picture" of project management.

Earned value management is recast using the newer, simpler terms of planned value, earned value, and actual costs versus the previous acronym soup of BCWS (budgeted cost of work scheduled), BCWP (budgeted cost of work performed), and ACWP (actual cost of work performed). Earned value concepts are integrated into several knowledge areas, showing the connection of this powerful control tool across the life of the project.

Several knowledge areas include new tools, showing that the *PMBOK® Guide* itself is an example of progressive elaboration. This latest edition adds detail to areas that previously had been only generally described. Readers will find much more utility in this text that describes not only what to do but also how to do it well.

Other improvements include more emphasis on customer focus, stronger linkage to organization strategy, and greater acknowledgement of the role of project offices. Sharp-eyed readers will also notice standardization of terms and correction of previous errors throughout the text.

As an approved American national standard (ANSI/PMI 99-001-2000), the *PMBOK® Guide—2000 Edition* is a must-have resource for anyone involved in project management. It provides enhanced knowledge for practitioners and will be a foundation for project management professional certification testing beginning in 2002. Obtain a copy now, learn

from it, and provide comments to PMI so that the next edition will be better still.

This book is available from the Project Management Institute bookstore at www.pmibookstore.org or may be downloaded free at www.pmi.org.

The Brand You50: Fifty Ways to Transform Yourself from an "Employee" into a Brand that Shouts Distinction, Commitment, and Passion!

By Tom Peters

Alfred A. Knopf Inc., New York, 1999

Reviewed by LTC John Lesko (U.S. Army Reserve), a Decision Coach and Group Facilitator for Anteon Corp. Lesko is a member of the Army Acquisition Corps and a frequent contributor to Army AL&T. He can be contacted at John.Lesko@saftas.com.

Tom Peters dedicates *The Brand You50* to MJ, Oprah, and Martha. So the reader must ask, what can a member of the Defense acquisition workforce learn from Michael Jordan, Oprah Winfrey, and Martha Stewart? On first examination, it would seem that these celebrities have absolutely nothing to do with research and development or the procurement of emerging national Defense capabilities. However, after reading *The Brand You50*, this reviewer now thinks otherwise.

The Brand You50 serves as the third leg of the three-legged stool in Tom Peters' *50Lists Series* of management guidebooks. These books aim to revolutionize today's white-collar, knowledge-based workforce. In this reviewer's opinion, such a goal truly qualifies as a WOW project. Tom Peters delivers with a book design that makes for a quick and easy read. The author's word choice and conversational style are consistent with the other books in this series. Common design elements of the series are listed below.

- Each chapter is 4-6 pages long and focuses on either a thought-provoking story or an insightful observation.
- Each chapter begins with a fairly clear thesis statement, which Peters labels "The Nub," and ends with suggested "Things To Do (TTDs)."
- Each chapter holds your attention as the author cites key statistics, outlines relevant business trends, or refers you to additional readings.

According to Peters, "*Brand YOUs* take charge of their own lives...They are not water-walkers...They know that *Big Co.* ain't going to take care of them from cradle (age 21) to grave (age 65). They know that they are skills dependent, distinction dependent, network/Rolodex dependent, project (WOW project) dependent, and growth dependent." Defense acquisition workers could benefit by adopting these traits.

So why would Tom Peters dedicate his book to MJ, Oprah, and Martha? Peters claims "Real Brand YOUs don't need full names." People recognize their achievements as being bigger than life, audacious, and unique. All of these celebrities are at the top of their respective games, and they have achieved a level of distinction that sets them apart from their contemporaries. They are peerless, committed to excellence, and their passion serves as an example for all others.

On that note, perhaps it is time for each acquisition workforce member to re-examine his or her distinction, commitment, and passion. Further, as acquisition professionals, we should look beyond the cynicism frequently heard when discussions turn to the Army's new black beret or to the latest recruiting slogan. Being *An Army of One* or *An Acquisition Corps of One* might just be a good thing if it instills distinction, commitment, and passion.

ACQUISITION EXCELLENCE

Acquisition And Logistics: From Reform To Excellence

The Acquisition Reform Office has been renamed the Acquisition Excellence Office, reflecting the changing role of acquisition and logistics in the Army's transformation. Led by Secretary of the Army Thomas E. White and Army Chief of Staff GEN Eric K. Shinseki, the Army is committed to fundamental change to ensure the Nation's security interests are preserved in the face of the dramatically changing requirements of the 21st century.

The acquisition and logistics reform legislation and initiatives of the last decade have changed Army business processes and partnerships with industry in significant and positive ways. Taking these reform measures to the next level of excellence is vital to achieving the new Army vision. By leveraging new technologies and applying a synthesis of sound business practices, innovation, and leadership expertise, the Army will continue to maximize force modernization, reduce total ownership costs, and significantly reduce cycle times.

Today's acquisition and logistics decisions will enable the Army to sustain and recapitalize the Legacy Force and field an Interim Force even as it transforms its present structure to achieve and sustain the Objective Force—a combat brigade deployable anywhere in the world in 96 hours, a division on the ground in 120 hours, and five divisions on the ground in theater in 30 days.

Commitment and hard work throughout the Army's acquisition, logistics, and technology communities will be required to meet these tough challenges and achieve the new Army vision. Given the progress that has been made to date, there is every reason to believe that the Army will achieve its fundamental goals and take acquisition and logistics from reform to excellence.

For additional information, contact Monti Jagers at (703) 681-7571 or monteze.jagers@saalt.army.mil.

CD-ROM Test Reports Available

Do you want to read a paper test report or take a virtual tour of the test? The U.S. Army Operational Test Command (OTC) Airborne and Special Operations Test Directorate (ABNSOTD) at Fort Bragg, NC, provides the plan, the report, and other associated test documentation on a CD to its customers. The ultimate product is called a CD-ROM Test Report, and the first one was produced in January 2001.

The final production is a multimedia presentation that includes documents, images, videos, music, and well-thought-out hyperlinks. Also included with the CD-ROM is the software necessary to view, print, and navigate the various documents or key information associated with each project. This format not only tells the story of the test, but also provides supporting documents and images that were not included in the report.

CD-ROM publishing is the most efficient way to organize all the files about one project in one convenient package. All the documents relating to each test are easily accessible, whether the customer needs to print a document, copy and paste text or graphics, or perform a search using keywords. The search link, included on the CD, will generate a list of all the documents that contain the keywords or phrases that the user specifies. For example, if users do not know the exact file name, but they know some keywords that might be included in the document, all they need to do is use the search option conveniently located at the main menu. The search feature is just one of the user-friendly tools that are included on the CD. The following paragraphs address some of the other features of this multimedia report.

Instead of wondering how to open the CD, it is set to automatically run once it is placed into the CD drive. The autorun is linked to a welcome screen that automatically accesses the proper files, loads them, and starts the main menu.

The main menu is the remote control or the browser page that enables users to go to a preferred location on the CD. The main menu is designed specifically for each project. There is no guesswork involved; the main menu and sub-menus consist of buttons for viewing or printing documents and photographs and playing videos. Bookmarks or hyperlinks also make it easy for the user to navigate through the documents.

The hyperlinked photographs and video selections are intended to show the user any problems or damages encountered during a test as well as many of the typical events. The executive summary video, with voice-over narration by the test officer, tells the story of the major events of the test. Other photographs that relate to the test but are not included in the test report are easily accessible from the same CD. Also included is a video that shows the testing capabilities of ABNSOTD. From the airdrop of personnel, heavy equipment, and cargo, to the operational field testing of new weapons, equipment, and techniques, this unique organization ensures that soldiers can get to where they have to go—and fight and win once there.

Forward thinking has allowed ABNSOTD to produce a dynamic CD-ROM test report that incorporates interactive photography and video in a manner that enhances test documentation, thus making it more useful to our customers. So, before you read the paper copy of our test reports, take a virtual tour of the test instead.

This article was submitted by Nora Campbell, Chief of the Editorial Branch, ABNSOTD. For further information about the CD-ROM Test Report, contact her at (910) 396-2613, DSN 236-2613, or at campbellnora@otc.army.mil.

Natick Leads Individual Soldier Transformation Effort

As the Army continues its transformation to the Objective Force for 2020 and beyond, the U.S. Army Soldier and Biological Chemical Command (SBCCOM) Natick Soldier Center (NSC) is taking the lead in an effort to transform the individual soldier.

With a substantial influx of research and development funding, the Objective Force Warrior (OFW) Program will be the Army's flagship program to develop a revolutionary warrior concept and will serve as an Objective Force transformation pillar next to the Future Combat Systems (FCS). The program began in October 2001 with competing industrial teams developing concepts for a revolutionary future warrior. The program will conclude in September 2008 with system-level demonstrations of up to two competing designs. A contract solicitation package is currently being developed and should be released in the December 2001 timeframe.

Using the Army's soon-to-be-fielded Land Warrior as a baseline and point of departure, the OFW Program will develop revolutionary advances in soldier lethality, individual survivability, communication, power sources, soldier mobility and sustainability, and human performance. Early and continuous integration of all system and subsystem components will be the key to the success of the OFW Program.

By employing a contracting approach similar to that being used for the FCS, the Army will award competing integration contracts/agreements to industry teams. These teams will be charged with developing a warfighter concept by leveraging ongoing Army, Defense Advanced Research Projects Agency, and other DOD science and technology investments, and by introducing the latest commercial technologies.

The Army is also seeking to entice "nontraditional" industrial players into the program as well. To attract these nontraditionals, Natick will employ a new contracting/agreements approach that cuts red tape and makes it easier for companies to do business with the government.

For more information about NSC or SBCCOM, see the Web site at <http://www.sbccom.army.mil>.

Statement of Ownership, Management, and Circulation	
Period: January 1, 2001 to December 31, 2001	
1. Publication Title	Army AL&T
2. Issue Frequency	Monthly
3. Issue Date	January 2001
4. Issue Number	1
5. Publication Title	Army AL&T
6. Issue Frequency	Monthly
7. Issue Date	January 2001
8. Issue Number	1
9. Publication Title	Army AL&T
10. Issue Frequency	Monthly
11. Issue Date	January 2001
12. Issue Number	1
13. Publication Title	Army AL&T
14. Issue Frequency	Monthly
15. Issue Date	January 2001
16. Issue Number	1
17. Publication Title	Army AL&T
18. Issue Frequency	Monthly
19. Issue Date	January 2001
20. Issue Number	1
21. Publication Title	Army AL&T
22. Issue Frequency	Monthly
23. Issue Date	January 2001
24. Issue Number	1
25. Publication Title	Army AL&T
26. Issue Frequency	Monthly
27. Issue Date	January 2001
28. Issue Number	1
29. Publication Title	Army AL&T
30. Issue Frequency	Monthly
31. Issue Date	January 2001
32. Issue Number	1
33. Publication Title	Army AL&T
34. Issue Frequency	Monthly
35. Issue Date	January 2001
36. Issue Number	1
37. Publication Title	Army AL&T
38. Issue Frequency	Monthly
39. Issue Date	January 2001
40. Issue Number	1
41. Publication Title	Army AL&T
42. Issue Frequency	Monthly
43. Issue Date	January 2001
44. Issue Number	1
45. Publication Title	Army AL&T
46. Issue Frequency	Monthly
47. Issue Date	January 2001
48. Issue Number	1
49. Publication Title	Army AL&T
50. Issue Frequency	Monthly
51. Issue Date	January 2001
52. Issue Number	1
53. Publication Title	Army AL&T
54. Issue Frequency	Monthly
55. Issue Date	January 2001
56. Issue Number	1
57. Publication Title	Army AL&T
58. Issue Frequency	Monthly
59. Issue Date	January 2001
60. Issue Number	1
61. Publication Title	Army AL&T
62. Issue Frequency	Monthly
63. Issue Date	January 2001
64. Issue Number	1
65. Publication Title	Army AL&T
66. Issue Frequency	Monthly
67. Issue Date	January 2001
68. Issue Number	1
69. Publication Title	Army AL&T
70. Issue Frequency	Monthly
71. Issue Date	January 2001
72. Issue Number	1
73. Publication Title	Army AL&T
74. Issue Frequency	Monthly
75. Issue Date	January 2001
76. Issue Number	1
77. Publication Title	Army AL&T
78. Issue Frequency	Monthly
79. Issue Date	January 2001
80. Issue Number	1
81. Publication Title	Army AL&T
82. Issue Frequency	Monthly
83. Issue Date	January 2001
84. Issue Number	1
85. Publication Title	Army AL&T
86. Issue Frequency	Monthly
87. Issue Date	January 2001
88. Issue Number	1
89. Publication Title	Army AL&T
90. Issue Frequency	Monthly
91. Issue Date	January 2001
92. Issue Number	1
93. Publication Title	Army AL&T
94. Issue Frequency	Monthly
95. Issue Date	January 2001
96. Issue Number	1
97. Publication Title	Army AL&T
98. Issue Frequency	Monthly
99. Issue Date	January 2001
100. Issue Number	1

Statement of Ownership, Management, and Circulation	
Period: January 1, 2001 to December 31, 2001	
1. Publication Title	Army AL&T
2. Issue Frequency	Monthly
3. Issue Date	January 2001
4. Issue Number	1
5. Publication Title	Army AL&T
6. Issue Frequency	Monthly
7. Issue Date	January 2001
8. Issue Number	1
9. Publication Title	Army AL&T
10. Issue Frequency	Monthly
11. Issue Date	January 2001
12. Issue Number	1
13. Publication Title	Army AL&T
14. Issue Frequency	Monthly
15. Issue Date	January 2001
16. Issue Number	1
17. Publication Title	Army AL&T
18. Issue Frequency	Monthly
19. Issue Date	January 2001
20. Issue Number	1
21. Publication Title	Army AL&T
22. Issue Frequency	Monthly
23. Issue Date	January 2001
24. Issue Number	1
25. Publication Title	Army AL&T
26. Issue Frequency	Monthly
27. Issue Date	January 2001
28. Issue Number	1
29. Publication Title	Army AL&T
30. Issue Frequency	Monthly
31. Issue Date	January 2001
32. Issue Number	1
33. Publication Title	Army AL&T
34. Issue Frequency	Monthly
35. Issue Date	January 2001
36. Issue Number	1
37. Publication Title	Army AL&T
38. Issue Frequency	Monthly
39. Issue Date	January 2001
40. Issue Number	1
41. Publication Title	Army AL&T
42. Issue Frequency	Monthly
43. Issue Date	January 2001
44. Issue Number	1
45. Publication Title	Army AL&T
46. Issue Frequency	Monthly
47. Issue Date	January 2001
48. Issue Number	1
49. Publication Title	Army AL&T
50. Issue Frequency	Monthly
51. Issue Date	January 2001
52. Issue Number	1
53. Publication Title	Army AL&T
54. Issue Frequency	Monthly
55. Issue Date	January 2001
56. Issue Number	1
57. Publication Title	Army AL&T
58. Issue Frequency	Monthly
59. Issue Date	January 2001
60. Issue Number	1
61. Publication Title	Army AL&T
62. Issue Frequency	Monthly
63. Issue Date	January 2001
64. Issue Number	1
65. Publication Title	Army AL&T
66. Issue Frequency	Monthly
67. Issue Date	January 2001
68. Issue Number	1
69. Publication Title	Army AL&T
70. Issue Frequency	Monthly
71. Issue Date	January 2001
72. Issue Number	1
73. Publication Title	Army AL&T
74. Issue Frequency	Monthly
75. Issue Date	January 2001
76. Issue Number	1
77. Publication Title	Army AL&T
78. Issue Frequency	Monthly
79. Issue Date	January 2001
80. Issue Number	1
81. Publication Title	Army AL&T
82. Issue Frequency	Monthly
83. Issue Date	January 2001
84. Issue Number	1
85. Publication Title	Army AL&T
86. Issue Frequency	Monthly
87. Issue Date	January 2001
88. Issue Number	1
89. Publication Title	Army AL&T
90. Issue Frequency	Monthly
91. Issue Date	January 2001
92. Issue Number	1
93. Publication Title	Army AL&T
94. Issue Frequency	Monthly
95. Issue Date	January 2001
96. Issue Number	1
97. Publication Title	Army AL&T
98. Issue Frequency	Monthly
99. Issue Date	January 2001
100. Issue Number	1

ARMY AL&T WRITER'S GUIDELINES

<http://dacm.rdaisa.army.mil/>

Army AL&T is a bimonthly professional development magazine published by the Office of the Assistant Secretary of the Army (Acquisition, Logistics and Technology). The address for the Editorial Office is DEPARTMENT OF THE ARMY, ARMY AL&T, 9900 BELVOIR RD, SUITE 101, FT BELVOIR VA 22060-5567. Phone numbers and e-mail addresses for the editorial staff are as follows:

Harvey L. Bleicher, Editor-in-Chief	bleicheh@aaesa.belvoir.army.mil	(703)805-1035/DSN 655-1035
Debbie Fischer-Belous, Executive Editor	fischerd@aaesa.belvoir.army.mil	(703)805-1038/DSN 655-1038
Cynthia Hermes, Managing Editor	hermescc@aaesa.belvoir.army.mil	(703)805-1034/DSN 655-1034
Sandra R. Marks, Contract Support	markss@aaesa.belvoir.army.mil	(703)805-1007/DSN 655-1007
Joe Stribling, Contract Support	striblinga@aaesa.belvoir.army.mil	(703)805-1036/DSN 655-1036

Datafax: (703)805-4218/DSN 655-4218

Purpose

To instruct members of the AL&T community about relevant processes, procedures, techniques, and management philosophy and to disseminate other information pertinent to the professional development of the Army Acquisition and Technology Workforce (A&TWF).

Subject Matter

Subjects may include, but are not restricted to, professional development of the Army's A&TWF, AL&T program accomplishments, technology developments, policy guidance, information technology, and acquisition reform initiatives. Acronyms used in manuscripts, photos, illustrations, and captions must be kept to a minimum and must be defined on first reference. Articles submitted to *Army AL&T* will not be accepted if they have been scheduled for publication in other magazines.

Length of Articles

Articles should be approximately 8 double-spaced typed pages, using a 20-line page, and must not exceed 1,600 words. Articles exceeding 1,600 words will not be accepted. Do not submit articles in a layout format or articles containing footnotes, endnotes, or acknowledgement lists of individuals.

Photos and Illustrations

A maximum of 3 photos or illustrations, or a combination of both, may accompany each article in a separate file from the manuscript. Photos may be black and white or color. Illustrations must be black and white and must not contain any shading, screens, or tints. All electronic files of photos must have a resolution of at least 300 dpi (JPEG or TIFF). If they do not meet this requirement, glossy prints of all photos must be submitted via U.S. mail, Fedex, etc. Photos and illustrations will not be returned unless requested.

Biographical Sketch

Include a short biographical sketch of the author/s that includes educational background and current position.

Clearance

All articles must be cleared by the author's security/OPSEC office and public affairs office prior to submission. The cover letter accompanying the article must state that these clearances have been obtained and that the article has command approval for open publication.

Offices and individuals submitting articles that report Army cost savings must be prepared to quickly provide detailed documentation upon request that verifies the cost savings and shows where the savings were reinvested. Organizations should be prepared to defend these monies in the event that higher headquarters have a higher priority use for these savings. All *Army AL&T* articles are cleared by the Army Acquisition Career Management Office.

Submission Dates

<i>Issue</i>	<i>Author's Deadline</i>
January-February	15 October
March-April	15 December
May-June	15 February
July-August	15 April
September-October	15 June
November-December	15 August

Submission Procedures

Article manuscripts (in MS Word) and illustrations/photos (300 dpi JPEG or TIFF) may be submitted via e-mail to bleicheh@aaesa.belvoir.army.mil, or via U.S. mail to the address in the first paragraph at the top of this page. All submissions must include the author's mailing address; office phone number (DSN and commercial); and a typed, self-adhesive return address label.

SPECTRUM OF MILITARY OPERATIONS

In the wake of growing global instability, diverse and increasingly complex threats pose a direct challenge to our national security and our national defense. Our military must be decisive in all areas of the operational spectrum. We cannot focus on only one area at the exclusion of others; we must broaden our capabilities.

The multitude of threats, coupled with rising worldwide political uncertainties, is in opposition to the sovereignty of all nations. This vast multitude of threats ranges from domestic disasters on the left side of the spectrum to conventional and nuclear war on the right side of the spectrum. In addition, there are environmental and humanitarian challenges that must be addressed. Combined, these threats comprise the "full-spectrum threat."

This full-spectrum threat evolved primarily from post-Cold War insurgencies, contingencies, and conflicts to today's multiple global threats. Awareness of global threats was made possible as the result of information technology (IT). IT accessibility and affordability provide the capability to attain a large volume of data at phenomenal speed. Further, information-based technology, devices, and weapons give our enemies knowledge-enhanced capabilities that serve as substitutes for their lack of military power.

The full-spectrum threat also empowers radical elements, terrorist organizations, and law-defiant subcommunities to become destructive enemies of sovereign states. These groups will continue to emerge and gain momentum toward global instability and disruption of diplomatic harmony. Global terrorist activities supported by counterfeit and fanatic religious and political groups impose equal challenges for maintaining global stability and peace. As a united Nation, we must be prepared to fight and win the next battles, ranging from homeland defense, to global defense, to major theaters of war.

This full-spectrum threat denotes the wide range of military operations our Nation must be capable of resolving anytime, anywhere, and at any level. Our Army is fully conscience of these multiple threats, and we are rapidly employing numerous enhancements to change the way the Army organizes and fights. The roadmap to do this is the Army Transformation Campaign Plan, a direct result of the Army vision. This critical transformation will result in a superior world-class ground force defined as the Objective Force. This Objective Force will enable our soldiers to decisively fight and win the first—and all subsequent—terrestrial battles at any point across the spectrum of military operations.

LTC Derek L. Anderson
Office of the Objective Force Task Force

ARMY AL&T
ISSN 0892-8657

PERIODICALS

DEPARTMENT OF THE ARMY
ARMY ALT
9900 BELVOIR RD SUITE 101
FT BELVOIR VA 22060-5567

S111 P3 G
DTIC SUITE 0944
8725 JOHN J KINGMAN ROAD ATTN
FORT BELVOIR VA 22060

